

DEPARTMENT OF THE INTERIOR

REPORT

OF THE

SURVEYOR GENERAL

OF

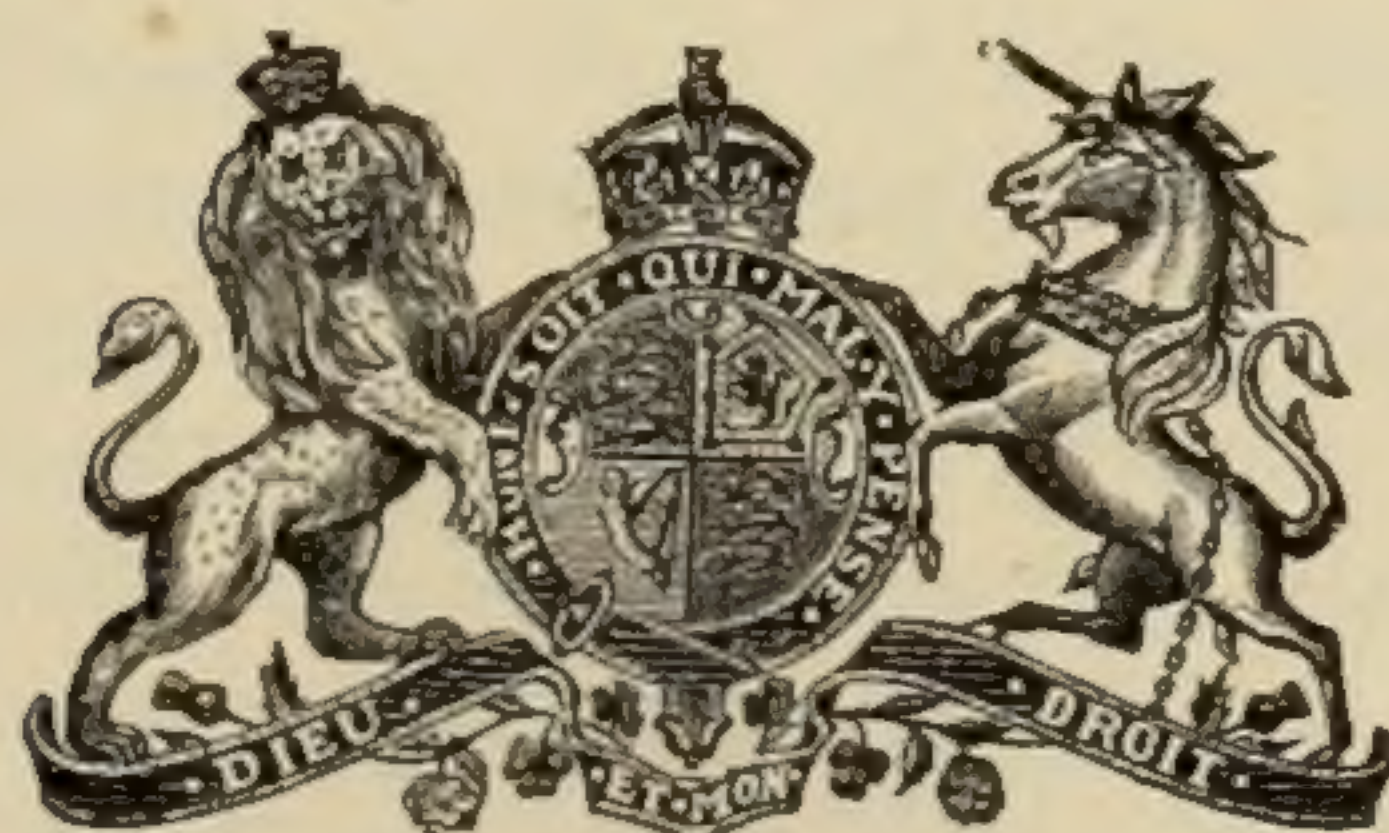
DOMINION LANDS

FOR THE

YEAR ENDING JUNE 30

1906

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY

1907

DEPARTMENT OF THE INTERIOR,
TOPOGRAPHICAL SURVEYS BRANCH,
OTTAWA, October, 1906.

The Deputy of the
Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report upon the operations of the Topographical Surveys Branch for the twelve months ending June 30, 1906.

The season for making surveys being generally the summer and autumn months, it is convenient to refer to the operations by calendar years, although it involves some repetition in the successive annual reports.

SURVEYS OF 1905.

One hundred and ninety-three whole townships and two fractional townships were completely subdivided during the calendar year of 1905, while eighty-one townships were partially subdivided. There were also twenty-six whole townships and nine fractional townships completely re-surveyed, while forty-one townships were partially re-surveyed. Forty-nine survey parties were employed, forty-five being engaged on township surveys and four on other surveys. Of the parties engaged twenty-nine were paid by the day and twenty were working under contract. Five of the parties under daily pay were located in Manitoba, four in Saskatchewan, twelve in Alberta and three in British Columbia. The remaining parties worked partly in one province and partly in another. One contractor was located in Manitoba, four in Saskatchewan, fourteen in Alberta and one in the Yukon Territory. The twenty-nine parties under daily pay were distributed as follows:—

1. C. F. Aylsworth.—Re-survey in western Manitoba and eastern Saskatchewan.
2. David Beatty.—Re-surveys in northeastern Alberta.
3. P. R. A. Belanger.—Supervisor of surveys.
4. E. Bray.—Re-surveys east of Lake Manitoba.
5. L. T. Bray.—Re-surveys in southwestern Manitoba.
6. R. W. Cautley.—Block lines, northwest of Edmonton.
7. W. A. Ducker.—Outlines in southeastern Manitoba.
8. A. Driscoll.—Block lines in the Peace River district.
9. C. C. Fairchild.—Subdivision surveys north of Banff, Alberta.
10. L. E. Fontaine.—Re-surveys west of Edmonton, Alberta.
11. J. Francis.—Subdivision surveys northeast of Yorkton.
12. G. A. Grover.—Re-surveys north of Winnipeg.
13. E. W. Hubbell.—Re-surveys south of Prince Albert, Saskatchewan.
14. A. W. Johnson.—Subdivision in western British Columbia.
15. R. C. Laurie.—Re-posting, townsite of Battleford.
16. G. J. Lonergan.—Re-surveys near Red Deer, Fort Saskatchewan, Alberta.
17. J. A. Macdonell.—Exploration survey in British Columbia.
18. C. F. Miles.—Miscellaneous subdivision work in southwestern Alberta.
19. W. G. McFarlane.—Inspection of survey contracts.
20. T. S. Nash.—Inspection of survey contracts.
21. Geo. Ross.—Re-surveys and other surveys.
22. J. E. Ross.—Subdivision eastern British Columbia.
23. A. Saint Cyr.—Block lines in the Peace River district.
24. B. J. Saunders.—Block lines northwest of Edmonton.

6-7 EDWARD VII., A. 1907

25. H. W. Selby.—Block lines in the Peace River district.
 26. J. N. Wallace.—Block lines in the Peace River district.
 27. Jas. Warren.—Re-surveys south of Moosejaw, Saskatchewan.
 28. M. B. Weekes.—Block outlines in northern Manitoba.
 29. A. O. Wheeler.—Topographical survey in the Rocky Mountains.

Two inspectors of surveys were employed :—T. S. Nash, D.L.S., of the office staff, and Walter G. McFarlane, D.L.S. Each had a party of the usual strength for inspection, and their work extended over the whole season. Mr. McFarlane inspected the survey contracts in western and northern Alberta and Mr. Nash those in eastern Alberta, Saskatchewan and Manitoba. The number of contracts examined was 27.

The mileage surveyed in the last three years is tabulated below:—

	1905.	1904.	1903.
	Miles.	Miles.	Miles.
Township outlines.....	1,591	1,285	833
Section lines.....	10,544	24,488	25,982
Traverse.....	1,809	4,441	4,050
Re-survey.....	2,579	7,699	5,390
Total for season.....	16,523	37,913	36,255
Number of parties.....	46	80	65
Average per survey party.....	359	474	558

The following table shows the mileage surveyed by the parties under daily pay and that by the parties under contract:—

Work of parties under daily pay.	1905.	1904.	1903.
	Miles.	Miles.	Miles.
Township outlines.....	1,008	719	632
Section lines.....	939	235	478
Traverse.....	421	223	236
Re-survey.....	2,499	2,122	497
Total for the season.....	4,867	3,299	1,843
Number of parties.....	26	22	12
Average miles per party.....	187	150	154

Work of parties under contract.	1905.	1904.	1903.
	Miles.	Miles.	Miles.
Township outlines.....	583	566	201
Section lines.....	9,605	24,253	25,476
Traverse.....	1,388	4,218	3,808
Re-survey.....	80	2,809	1,793
Total for the season.....	11,656	31,846	31,278
Number of parties.....	20	57	52
Average miles per party.....	583	559	601

NOTE.—In the tables of mileage the parties under Messrs. Wheeler, Macdonell and Laurie are not included because of the nature of their work.

SURVEYS OF 1906.

Prior to July 1, 1906, forty-nine survey parties were engaged on township surveys and four on other surveys. Of the parties employed twenty-nine were paid by the day and twenty-four were under contract. Eight of the contracts were for the subdivision

SESSIONAL PAPER No. 25b

of townships in Manitoba, three in Saskatchewan and thirteen in Alberta. The twenty-nine parties under daily pay were distributed as follows:—

1. C. F. Aylsworth.—Re-surveys northeast of Winnipeg, Man.
2. David Beatty.—Re-survey and correction north of Prince Albert and east of Battleford, Sask.
3. P. R. A. Belanger.—Re-survey near Yorkton, Sask.
4. L. T. Bray.—Subdivision in southwestern Alberta.
5. P. A. Carson.—Triangulation in the Railway Belt, British Columbia.
6. W. Christie.—Re-surveys northwest of Winnipeg, Man.
7. W. J. Deans.—Re-survey and subdivision of lands adjacent to Lake Manitoba.
8. C. C. Fairchild.—Subdivision north of Banff, Alta.
9. L. E. Fontaine.—Miscellaneous surveys in eastern Alberta and western Saskatchewan.
10. Geo. A. Grover.—Re-surveys northwest of Winnipeg, Man.
11. A. H. Hawkins.—Re-surveys and subdivision east of Coutts, Alta.
12. E. W. Hubbell.—Re-surveys northwest of Moosejaw, Sask.
13. A. W. Johnson.—Survey of southern limit of the Railway Belt, British Columbia.
14. R. C. Laurie.—Re-posting, townsite of Battleford.
15. G. J. Lonergan.—Re-surveys and other surveys near Fort Saskatchewan, Alta.
16. J. A. Macdonell.—Exploration survey in British Columbia.
17. Geo. McMillan.—Inspection of survey contracts.
18. C. F. Miles.—Re-survey and subdivision southwest of Calgary, Alta.
19. W. F. O'Hara.—Re-surveys southeast of Red Deer, Alta.
20. A. W. Ponton.—Outlines north of Athabaska Landing, Alta.
21. W. R. Reilly.—Re-surveys east of Saskatoon, Sask.
22. J. F. Richard.—Miscellaneous surveys at Cumberland and Le Pas on the Saskatchewan river.
23. J. E. Ross.—Subdivision and other surveys in the Railway Belt, British Columbia.
24. A. Saint Cyr.—Block lines in the Peace River district.
25. J. B. Saint Cyr.—Survey of settlement at Vermilion, Alta.
26. H. W. Selby.—Subdivision near Lesser Slave lake.
27. J. N. Wallace.—Block lines north of Prince Albert, Sask.
28. J. Warren.—Re-surveys south of Moosejaw, Sask.
29. A. O. Wheeler.—Topographical survey in the Rocky mountains.

DESCRIPTION OF TOWNSHIPS.

Descriptions of the townships subdivided have been compiled from the surveyors' reports received during the twelve months ending June 30, 1906; they are given as Appendix No. 44. The townships are put in order of township, range and meridian, and the descriptions are preceded by a list of all townships described.

In the reports of the last three years similar compilations have been published. Prior to 1893 such descriptions were published from time to time in separate volumes covering different portions of the country, but these volumes are now almost exhausted, and, moreover, they are out of date, the surveys of the last fifteen or twenty years not being included. Many applications coming in for descriptions of this nature, it is hoped that at some early date authority may be obtained to combine and arrange all surveyors' reports to date, and to issue revised editions. Such a publication would be of considerable service to land prospectors and others interested in western lands.

EXPLORATION IN PEACE RIVER DISTRICT.

A party under Mr. J. A. Macdonell was engaged in an exploration with the object of selecting and locating three million five hundred thousand acres of land in the

6-7 EDWARD VII., A. 1907

Peace River district of British Columbia, granted to the Dominion as a compensation for the lands in the Railway Belt which had been alienated prior to the transfer of the belt to the Dominion. The operations of the party were continued throughout the year. Considerable information has been gathered, but the required tract of land has not yet been finally located.

YUKON TERRITORY.

Under the supervision of the director of surveys at Dawson work was continued, though on a somewhat less extended scale than last year. The returns of survey of thirty-six group lots were received, of which a list is given in appendix No. 5. Base lines were run on Caribou creek and Lion gulch, on the right and left forks of Eureka creek, on Flat creek and Isaac's gulch and on Bullion creek. A survey was also made of the Frooks hydraulic concession on Flat creek.

SCHEME FOR WATER WORKS IN KLONDIKE DISTRICT.

Mr. W. Thibaudeau, C.E., completed an extensive survey of the Klondike region in the Yukon Territory in connection with a proposal for bringing water from the Klondike river to be used in the gold mines. From his report the scheme appears to be a practicable one.

IRRIGATION SURVEYS.

These surveys were formerly carried out by an officer of this branch, Mr. J. S. Dennis, then inspector of surveys. When Mr. Dennis was appointed deputy minister of Public Works of the Northwest Territories at Regina, it was agreed that he should remain in charge of these surveys, and that they should continue to be carried out under the direction of this Branch. Mr. J. S. Dennis was succeeded as deputy minister by Mr. John Stocks, who also took charge of these surveys. On the formation of the new provinces of Saskatchewan and Alberta, Mr. John Stocks was reappointed chief engineer of irrigation, and the irrigation office was transferred from Regina to Calgary. Mr. John Stewart, D.L.S., was subsequently appointed commissioner of irrigation in succession to Mr. Stocks. Three parties were engaged on surveys during the present season in charge of Messrs. R. J. Burley, R. M. Saunders and J. F. Hamilton. Gauge readings on a number of streams were continued as in former years; they are generally taken by residents, to whom small payments are made.

NAKIMU CAVES.

A monograph on the caves recently discovered near Glacier, B.C., known as the 'Nakimu Caves' has been prepared by Mr. A. O. Wheeler, D.L.S., accompanied by a map of the caves. This monograph is inserted as appendix No. 41. It is illustrated by photographs taken by Mr. Wheeler and by Mr. W. S. Ayres, and will serve to draw attention to a natural feature of the mountains which in the future will attract many tourists.

MANUAL OF SURVEY.

The new edition of the Manual of Instruction for the Survey of Dominion Lands, which at the time of the issue of last year's report was in the hands of the printers, has since been published and distributed to surveyors in the field and to the members of the office staff. Subsequent to the issue of this edition an order in council was passed making various changes in the rates received by survey contractors and surveyors working under daily pay. In addition to this, other amendments were required. They were all printed in booklet form and sent to all the surveyors employed by the department.

The astronomical field tables, which in the past have proved to be of very great value to surveyors in furnishing a ready and accurate means of reducing their obser-

SESSIONAL PAPER No. 25b

vations, continue to be issued. A description of these tables is given in the report of 1904. Formerly each set of tables covered six successive months, but those now issued are good in some cases for two months only out of each year and for three successive years; in other cases they are good for three months out of each year and for two successive years. The reason for the change is this. The apparent motion of the pole star is in cycles, and it returns approximately to the same position from year to year, although not at the same time of the year. Its position then for a given period one year is approximately the same as its position for another period of the next year, and so on. It was found that tables when constructed for a short period of each year, but for two or three years, as the case might be, could be made to cover six months in this way with greater accuracy than six successive months for a single year. Our surveys are increasing in precision every year, and this is due in no small degree to the use of these astronomical field tables in connection with the new pattern of transit theodolite supplied by this office. The chief objection which formerly existed to taking a sufficient number of observations to produce accurate surveys was the amount of time and trouble required to make the reduction. Under present conditions, however, a very few minutes suffice for this work.

As a further aid to surveyors in taking and reducing observations on the pole star, a diagram of the altitude and azimuth of the pole star has been published since last year's report. Although the calculation required in finding the altitude of the pole star and its bearing from the tables is very simple, some surveyors prefer to have no calculation whatever: this condition is fulfilled in the abacus of the altitude and azimuth of the pole star. It is in the form of a printed card six by seven and one-half inches, showing on one side of the card the bearing and on the reverse side the altitude of the pole star. The altitude and bearing of the pole star are given by it to practically the same degree of accuracy as by the tables. The abacus covers the same periods as the astronomical field tables and accompanies them when sent to surveyors; it furnishes an excellent check on calculations made from the tables.

CORRESPONDENCE.

The correspondence consisted of:—

Letters received.	8,965
Letters sent.	9,452

The staff consists of one correspondence clerk, three stenographers and typewriters and two messengers.

ACCOUNTS.

The accountant's records show:—

Number of accounts dealt with.	704
Amount of accounts.	\$599,780
Cheques forwarded.	2,056

OFFICE WORK.

A list of the office staff of part of the Topographical Surveys Branch at Ottawa is given in Appendix No. 12.

A number of changes have taken place during the twelve months. In the Metcalfe street office Mr. M. J. Cullen has been appointed stenographer and typewriter. Mr. Geo. McMillan, D.L.S., is in charge of a party in the field, inspecting surveys made under contract. Mr. J. C. Baker, D.L.S., has resigned to take a survey contract. Messrs. W. E. Weld, E. E. D. Wilson, F. W. Rice and A. J. Elder are acting temporarily as assistants to surveyors. Messrs. J. C. Baker, A. A. Bailie, Geo. L. Brown, A. d'Orsonnens, H. V. Finnie and W. J. Graham have left the office. Mr. J. D. McLennan has been transferred to the Boundary Commission. Mr. A. Groulx has been transferred

6-7 EDWARD VII., A. 1907

to the staff of the Geographer. Mr. M. F. Cochrane has been transferred to the Railway and Swamp Lands Branch. Mr. G. B. Dodge has been granted leave of absence to make a hydrographical survey of the harbour of Prince Rupert, the terminus of the Grand Trunk Pacific Railway on the Pacific coast. Mr. P. A. Carson, D.L.S., is in charge of surveys in British Columbia. The additions to the staff during the year are: Wm. Crawford, D.L.S., A. d'Orsonnens, T. A. Davies, Captain T. E. S. Davies, Wm. Elwell, graduate School of Practical Science, G. A. Grey, M. J. Carroll, graduate School of Practical Science, E. R. Williams. Messrs. A. Roger and D. F. Robertson have been re-appointed to the staff.

OFFICE OF THE CHIEF DRAUGHTSMAN.

A summary of the work executed in the chief draughtsman's office is given as Appendix No. 7.

This part of the branch was arranged some three years ago in five divisions, and the same arrangement is still in force.

FIRST DIVISION—INSTRUCTIONS AND GENERAL INFORMATION.

In the first division, where a variety of miscellaneous work is carried on, instructions were prepared for the guidance of the surveyors engaged during the year, involving the compilation of 1,092 sketches of township outlines, besides other sketches and copies of plans. About 530 applications for various information as to areas, survey monuments, &c., were dealt with, 245 preliminary plans of townships were made in triplicate, and some 400 miscellaneous plans and tracings. The registers of all field books, &c., received and other records are kept in this division.

SECOND DIVISION—EXAMINATION OF SURVEYORS' RETURNS.

The second division occupies the largest number of draughtsmen. Here most of the field notes received are examined, plans being compiled from them and the accounts of the contract surveys checked. A total of 744 sets of field notes were examined during the twelve months.

It may be of interest to give a short description of the methods now employed in compiling plans.

In 1903, it was decided by the Minister that the plans of the surveys of Dominion lands instead of being made by the surveyors as formerly should be prepared by the office staff from the surveyors' field notes. There were several reasons for such a radical change; among them it may be mentioned that the great amount of work to be done in connection with the examination of returns of surveys and the issue of the township plans in that and the succeeding years required to be handled systematically. It had long been recognized that the old style township plan was lacking in much information that would be of value to those dealing with the plans, such as registrars, land agents and the various officers of the department at Ottawa. Such information as the bearings and lengths of the lines surveyed, the description of the corner monuments, &c., is more useful than the topographical features of the country, the plans being intended primarily as a record of surveyed boundaries and for reference in dealing with the lands. It was found impracticable to merely add this valuable information to the plans as then issued. The principle now adopted is that of issuing two plans, a land plan, on which is shown such information as is necessary in dealing with the land, and another plan showing features of a topographical nature, such as hills, valleys, streams, marshes, the kinds and sizes of the timber and the class of soil, which although not required for the issue of patents are nevertheless of value for the purpose of general information. But the office staff not being numerically strong enough to meet the demand even for the land plans alone, the topographical plans have not yet been commenced.

SESSIONAL PAPER No. 25b

The new plans, however, do not overlook the topographical features altogether, as while the small details are omitted there are still shown the larger valleys and hills, all the rivers, streams and all the lakes of sufficient size to materially affect the value of the quarter sections in which they are situated. The areas, instead of being shown for each quarter-section only as formerly, are given in legal subdivisions to the nearest tenth of an acre where the quarter-section is broken by a body of water.

On the plans formerly issued, bush, water and swamps were represented by colours; this required that each plan should go through the press several times, once for each colour, which occupied much time and caused delays in the issue. By the system adopted one printing is all that is usually needed, the plans can be printed much more expeditiously and delays avoided. Printing in colours will be limited to the topographical plans.

As a result, the legal tariff of fees charged by the department for printed copies of township plans fixed by the order in council of April 12, 1880, at fifty cents per copy, was reduced by order in council of November 4, 1905, to ten cents per copy, which it is estimated will fully cover the cost of printing.

The colours, while they served a useful purpose and perhaps made the plans look more attractive, did not give much definite information. For instance, a green wash was used for bush, but there was no way of indicating whether the bush was composed of valuable timber or of a small growth of trees; the colours also being generally given along the surveyed lines only, and the interior of the sections left uncoloured, the plans were apt to mislead persons not familiar with them. The kinds and sizes of timber are indicated in a general way by a note on each plan. A great gain in uniformity has been attained by the plans being prepared in the office from the surveyors' notes. Another advantage of the new system is the speed with which plans can be issued. With the almost phenomenal increase in immigration to the Northwest during the last few years, the number of townships that have been surveyed is greatly in excess of the number surveyed in any other like period of time, with the exception perhaps of the years 1882, 1883 and 1884, when the Canadian Pacific Railway was being constructed. It would have been an almost impossible task to have issued township plans as they were wanted by the system then in use. By the present system the greater part of the land is open for entry almost as soon as the survey is made. The surveyors are instructed to report, at least once every month, the progress of their work, and to send in sketches of the lines surveyed with their bearings and lengths, distinguishing quarter-sections made fractional by water from the full quarter-sections. On receipt of these sketches, if the proper information is given and no mistakes in the survey are noticed, a preliminary plan is issued to the land agent in whose district the township is situated, and entry can be granted for the unbroken or full quarters. In the case of the fractional quarter-sections, entry is not granted until the issue of the final plan showing the correct areas.

One great cause of delay in the issue of the final plans still exists, and probably will never be overcome; that is the difficulty of communication between the head office and the surveyors. It is a very rare occurrence that the field notes of a survey are absolutely correct when received from the surveyor; clerical errors, omissions and discrepancies are nearly always found, and it is necessary to ask for further information, sometimes more than once, before the plan can be issued. If, as is often the case, the surveyor is fifty or one hundred miles from the nearest post office, a great deal of time elapses before replies can be received. This correspondence with the surveyor has been greatly reduced, however, since the plans are made in the office, the requests for further information now being in reference to the field notes only, instead of as formerly to the plan and field notes.

The introduction of this system required a large increase in the office staff as well as the adoption of new methods and processes; the latter have gradually been improved until a workable system of handling the returns has been evolved. The work has been to a great extent specialized, each clerk having his own particular work to do, which

6-7 EDWARD VII., A. 1907

he learns to do expeditiously. Uniformity of examination has also been reached to an extent which was not attained under the former system.

After a field book has been received and entered in the register, it is given a cursory examination, noting whether or not all the information required has been entered therein, whether the instructions have been followed, and in a general way whether the notes are acceptable. If any serious errors or omissions are discovered, the book is returned at once to the surveyor for correction; if not, the book is accepted and the examination is proceeded with. The astronomical observations are then checked and the information necessary to plot the plan is collected. Any former surveys made in the township and those adjoining have to be looked up, and all field notes and plans relating thereto procured from the Records Office. These consist of outline and subdivision surveys, railway right-of-way surveys, traverse surveys, surveys of Indian and other reserves, and of trails, lots and mineral locations. All plots of rivers and lakes, if not already made on the scale used in plotting the township plan, have to be reduced or enlarged, as the case may be, to the proper scale. This is done by photography; the outline of the lake or river traversed can then be traced directly to the township plan without going through the tedious process of replotting. An exhaustive examination of the field notes is then made, a rough plan being compiled at the same time. This includes checking the account, which in an ordinary township means adding up the chainage and classifying it under the different rates of payment for 250 to 300 items, checking over all triangulations and traverse surveys; entering the necessary information on the rough plans, calculating the areas of the full quarter sections, dividing the broken quarter sections up into legal subdivisions and calculating their areas, comparing the closings and corner monuments with those of adjoining surveys and preparing a memorandum of omissions, clerical errors and discrepancies to be sent to the surveyor with a request for explanations or further information. On receipt of his reply, the corrections which he indicates are made in his notes in red ink and the plans amended accordingly.

When the rough plan has been completed and checked, it is handed over to the draughtsmen who prepare finished plans and who form a distinct division of the office. They are not necessarily conversant with the details of the survey work, as the examiners must be.

The progress of the work in connection with the field notes and plans in this and other divisions is kept track of by means of slips attached to the books or plans. Each separate set of notes is given a 'job number' and as the slip passes from one man to another the dates and number of hours each was engaged are entered on it, forming a complete record from the receipt of the field notes to the issue of the printed plan. These slips show that many of the jobs pass through as many as twenty hands from first to last.

THIRD DIVISION—DRAWING FOR REPRODUCTION.

The third division of the draughting staff is engaged chiefly in drawing plans for reproduction by photo-zincography or lithography. Four hundred and forty-four township plans and eight plans of settlements or townsites, in addition to thirty-five other plans of various descriptions were completed during the year.

The method of preparing township plans for printing is that outlined in the annual report of the Surveyor General for 1905. All distances, bearings, areas and corner markings are stamped on the plans by means of type stamps. During the past year an effort has been made to have all the remaining work required on township plans done in the same manner. The great difficulty is to secure suitable styles of type, those in use for ordinary printing being, as a rule, not suitable for plans. However, type has been procured suitable for stamping names of lakes, rivers, railroads, &c., but for some of the work none has yet been obtained. It is also very difficult to stamp lettering which lies on a curve. Such work is being done at present in the old way by our more expert draughtsmen, though the aim in view is to have everything done by type.

SESSIONAL PAPER No. 25b

The plans of townships in British Columbia, owing to the mountainous character of the country, are usually quite complicated and irregular. These plans are the most difficult to prepare, and take up much more time than plans of prairie townships. It is necessary to carefully arrange all the details so as to have everything clear and unmistakable, giving each feature its proper prominence, and at the same time endeavouring to produce the most pleasing effect as a whole.

The work has been systematized so that at present each man has one particular line and no man turns out a complete plan. Each doing his own special part, the plan passes from one to the other until each line of work has been performed on it, making a complete plan ready for printing. The result of this system has been a saving in time, and also uniformity in the appearance of the finished plans. Four additional stamping outfits have been procured during the year and two more are being made. A small press capable of printing titles, notes, &c., has also been procured; for the work required, it is a great convenience.

FOURTH DIVISION—BRITISH COLUMBIA SURVEYS.

Another part of the office staff (the fourth division) looks after the surveys in the Railway Belt, British Columbia. The nature of these surveys being peculiar on account of the character of the country, and the earlier provincial surveys largely affecting the subdivision of the Dominion lands, it is found convenient to have men who deal with British Columbia work exclusively and become familiar with the many details which complicate it. Ninety-four books of field notes were examined, the methods pursued being very similar to those employed in the second division, and the rough plans when completed being sent on to be copied in the third division.

Two hundred and forty-seven miscellaneous plans and tracings were made, and two hundred and seventy applications for various information dealt with.

FIFTH DIVISION—MAPPING.

The remaining draughtsmen, the fifth division, compile and draw any maps that may be required. These consist chiefly of the 'sectional sheets' which are plotted on a scale of two miles to an inch and kept up to date from the township plans and any other material available. As soon as, from new surveys or other information, it seems necessary, a revised plan on tracing cloth is made and handed to the photographer, who reduces it to the scale of three miles to an inch on which these maps are lithographed. Another edition on a six-mile scale is issued for office use by further reduction, the small maps being found very convenient for many purposes. Twenty-one sheets were issued during the year on both scales. The sectional maps are confined to that part of the country in which subdivision surveys have been made.

Besides the usual routine work of adding new surveys, railways, post offices, &c., and preparing the maps for new editions, extra-work was caused by changes in the outlines of the sheets east of the second meridian. As mentioned in last year's report, it was found advisable to alter the scheme of numbering the sheets so as to cover on a uniform plan the whole extent of country in which Dominion lands are situated. The distance from east to west between the initial meridians of the system of survey is uniform (four degrees of longitude), except in the case of the meridian first established, which was run from a point about ten miles west of Pembina, without any reference to longitude, because the location was a convenient one for making the survey of the line. Two sectional sheets cover the space between any two adjoining meridians from the second meridian westerly, but as there are four ranges more between the first (the principal) meridian and the second, this space was mapped on three sheets of which one covered only a few ranges. The size of the sheets is now being made uniform throughout. This necessitated the re-drawing of the Lake of the Woods sheet and Cross Lake sheet and a new tracing of the Winnipeg sheet.

6-7 EDWARD VII., A. 1907

Pincer Creek and Kamloops sheets also had to be re-drawn because the originals were worn out by the numerous corrections and changes made on them; a new tracing of Lytton sheet was made for the same reason.

New blank forms suitable for all sectional maps between the 17th and 25th base lines were drawn, and are now being copied on stones by the lithographers.

These new forms are necessary on account of the extension of the surveys northward, the greater convergence of the meridians in the higher latitudes increasing the 'jogs' on the correction lines to such an extent that the diagrams in use for districts further south become unsuitable.

Apart from the sectional maps, a diagram of the Rocky Mountains triangulation with tables of angles and distances was drawn for photo-lithography; also a map of the semi-arid area of Alberta, and a series of diagrams showing the rainfall in different places for a number of years.

A list of the sectional sheets issued since the last report is given in Appendix No. 8.

ARREARS OF WORK.

The volume of business in this part of the branch is so large that it is found impossible to keep it up to date with the present staff, and even the most essential part of the work cannot be handled with the promptness that is desirable.

The delay in closing surveyors' accounts and in furnishing final plans of newly surveyed townships and of re-surveys, is a cause of frequent complaint. Many of the old plans which are out of print require re-compiling and printing, but we have been unable to prepare any during two or three years past. It is also very desirable that the series of topographical plans previously mentioned should be proceeded with. The surveyors' field notes contain a large amount of information as to lakes, ponds and swamps, hills and ridges, limits of tracts covered by bush and scrub, nature of timber and classification of the soil in respect to its value for agriculture, which is not at present readily available to the public, or even to officers of the department, being necessarily omitted from the land plans. Any attempt to place these details on one set of plans, in addition to those required for dealing with the lands, would result in so overcrowding the plans as to render them indistinct.

Some of the delay in issuing plans is unavoidable, and some is caused by circumstances exterior to the office and largely beyond our control, such, for instance, as surveyors failing to send in their field notes within a reasonable time, or to supply the additional information needed for plotting. Much of the delay would be avoided if the office staff were stronger, but the most serious cause of weakness is the constant changing of the personnel of the office. From January 1, 1905, to date, no less than forty-four draughtsmen left for one reason or another; some resigned to take employment elsewhere, others were transferred to different branches of the department. The result is that the staff is composed chiefly of men with very little experience and imperfectly acquainted with the business of the office. Effective administration under such conditions is an impossibility. It is most desirable that the staff should be increased to a number commensurate with the amount of work to be done, and that after men have been trained to our business and are conversant with it, we should be allowed to retain them. To show how far behind the office work is, it may be mentioned that the plans of about five hundred townships of which surveys have been completed or in which re-surveys have been made, remain unissued; new issues of the plans of about eight hundred townships are also needed but cannot be prepared by the present staff.

PHOTOGRAPHIC OFFICE.

In the photographic office there is a large increase in the work executed over that of last year, the total number of negatives and prints being eight thousand eight hundred and twenty-six against four thousand seven hundred and forty-six last year. The increase is chiefly in the number of silver prints, five thousand one hundred and

SESSIONAL PAPER No. 25b

twenty-four, as compared with nine hundred and sixty-six last year; many of these prints were for the Forestry Branch.

In the wet plate and photo-zincography department the township plans are reduced by photography from a scale of thirty chains to the inch to a scale of forty chains to the inch. Each plan is photographed on a 16-inch x 18-inch wet plate negative and printed on an 18-inch x 20-inch sheet of zinc. The process of photo-zincography, introduced in 1903 and 1904, and described in my report for 1904, has proved a success and is far superior to the old method of photo-lithography. It is more economical and the quality of the work is better. In less than one hour a township plan can be photographed, printed on zinc and transferred to the power press, a stage which could be reached under the old system only after four or five hours work, and frequently more when the weather conditions were unfavourable.

Sectional maps on a scale of two miles to the inch are reduced for publication to a scale of three miles. They are photographed in two sections on 18-inch x 20-inch wet plate negatives; they are then impressed on zinc and transferred in the lithographic office to large stones for printing. It is hoped in a short time to print these from the zinc plates direct. Another issue of the sectional maps is reduced by photography to a scale of six miles to the inch, and printed from zinc for office use.

In addition to the above are the traverses of lakes and rivers furnished by the surveyors with their field notes; these have to be reduced to the thirty chains scale. The average number pinned on the camera board is fifteen. They are first greatly reduced, after which the negative is placed in the enlarging camera and adjusted to the proper size. The image is thrown on bromide paper and when developed, washed and dried, is used for plotting out the township plans.

The work for the Geological Survey consists principally of photographing sections of maps for the purpose of enlarging or reducing the scales, a great help and saving of time to the draughtsmen.

On several occasions lantern slides transparencies were made for the Forestry Branch for use in illustrated lectures abroad and at home.

A schedule of the work executed is given as Appendix No. 10.

The staff is the same as at the date of the last report, namely one photographer in charge, one photo-lithographer and photo-engraver, three photographers and two assistants. A large part of their work is in direct connection with the preparation of township and other plans, reducing plans to proper scale for compiling and photographing for reproduction on zinc or stone the plans furnished by the draughtsmen.

LITHOGRAPHIC OFFICE.

Work was continued in the lithographic office on the same lines as last year. There has been some increase in the number of maps and forms printed and a decrease in the number of township plans.

No change was made in the staff, which consists of one foreman, one transferer, one power press printer, one lithographer, one stone polisher and one apprentice.

VISIT TO SOUTHAMPTON.

The methods and processes for the preparation and reproduction of plans outlined above were, to a large extent, adopted from those in use at the Ordnance Survey, Southampton, as described in their publications. This is the largest map-making establishment in the world; it is under the direction of specialists of great ability, and everything pertaining to map-making has been brought there to a high degree of perfection. Owing to the enormous increase in the number of plans issued by this office, their mode of production has assumed considerable importance and it is most desirable that the latest improvements should be introduced in our practice. I was accordingly authorized to visit the Ordnance Survey in order to become acquainted with the details of the organization and mode of execution of their work, which in technical matters of this

6-7 EDWARD VII., A. 1907

kind, cannot be fully understood from printed descriptions. The High Commissioner, Lord Strathcona, was kind enough to introduce me to Colonel R. C. Hellard, R.E., Director General of the Ordnance Survey, by whom I was received with the utmost courtesy. I was shown over the whole establishment by Colonel S. C. M. Grant, C.M.G., R.E., in charge of the Publication Branch, and Capt. W. J. Johnston, R.E., in charge of the Trigonometrical Branch; they spared no pains to show and explain everything in connection with their work. Advantage was taken of my presence in London to visit the establishments where the surveying instruments supplied to our surveyors are made. I had conferences with the makers and discussion with their men, which resulted in marked improvements in the patterns of our instruments. At the request of the Minister of Inland Revenue, I called at the International Bureau of Weights and Measures to obtain information respecting the organization and work of the bureau.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

The regular meeting of the board was held as directed by clause 101 of the Dominion Lands Act, on the second Monday in February, 1906, and following days. Special meetings were held from December 12 to 16, 1905, on April 20, on May 1, and from May 7 to 16, 1906.

The regular examinations were held during the February meeting at Ottawa, Toronto, Regina and Edmonton. Professor Stewart, D.T.S., of the School of Practical Science, presided at the examination in Toronto, F. J. Robinson, D.L.S., in Regina, and J. N. Wallace D.L.S., in Edmonton, the two latter gentlemen having been appointed as special examiners by an order in council, dated February 10, 1906.

Twenty-five candidates successfully passed the 'Preliminary Examination for Admission as Articled Pupil' as follows:—

A. H. Arens, Orillia, Ont.	S. N. Hill, Ottawa, Ont.
D. D. Cairnes, Ottawa, Ont.	P. N. Johnson, Edmonton, Alta.
W. M. Carthew, Edmonton, Alta.	G. R. Jones, Brantford, Ont.
A. L. Cumming, Ottawa, Ont.	A. E. Jupp, Toronto, Ont.
E. Flexman, Edmonton, Alta.	F. Lambert, Ottawa, Ont.
P. W. Greene, Orillia, Ont.	N. C. Mackinnon, Red Deer, Alta.
R. M. Hannon, Edmonton, Alta.	W. L. MacIlquham, Ottawa, Ont.
E. Harrison, Belleville, Ont.	J. F. Menzies, Staples, Ont.
B. F. Mitchell, Hamilton, Ont.	W. A. Scott, Galt, Ont.
G. L. Rainboth, Aylmer, Que.	W. N. Stewart, Hamilton, Ont.
F. W. Rice, Ottawa, Ont.	P. B. Street, Toronto, Ont.
H. F. Routly, Cambray, Ont.	W. M. Treadgold, Ottawa, Ont.
C. Ryley, Ottawa, Ont.	

Nineteen candidates passed the 'Final Examination for Admission as a Dominion Land Surveyor,' as follows:—

J. C. Baker, Vermilion, Alta.	F. H. Mackie, Ottawa, Ont.
E. R. Bingham, Toronto, Ont.	G. McMillan, Ottawa, Ont.
P. A. Carson, Ottawa, Ont.	H. J. McAuslan, Heathcote, Ont.
W. Christie, Chesley, Ont.	H. L. Seymour, Ottawa, Ont.
F. F. Clarke, Deer Park, Ont.	J. D. Shepley, Leamington, Ont.
T. A. Davies, Ottawa, Ont.	C. C. Smith, Ottawa, Ont.
J. S. Dobie, Regina, Sask.	A. G. Stacey, Ottawa, Ont.
A. H. Hawkins, Listowel, Ont.	C. M. Teasdale, Concord, Ont.
F. D. Henderson, Ottawa, Ont.	W. M. Tobey, Ottawa, Ont.
A. J. Latornell, Meaford, Ont.	

Bonds for the sum of one thousand dollars each, as required by clause 115 of the Dominion Lands Act, were received from seventeen candidates who had previously passed the necessary examinations for commissions as Dominion land surveyors.

Sixteen commissions to Dominion land surveyors were issued.

Every Dominion land surveyor is required by clause 125 of the Dominion Lands Act to be in possession of a subsidiary standard of length furnished by the secretary

SESSIONAL PAPER No. 25b

of the board of examiners. Eleven such standards were issued during the year. A list of surveyors who have been furnished with standard measures up to June 30, 1906, will be found in Appendix No. 4.

The correspondence of the board amounted to:—

Letters, &c., received	627
Letters sent	564

The examination papers used at the regular examination in February, 1906, and at a special examination in May, 1906, are submitted as Appendix No. 43.

APPENDICES.

The following documents are appended:—

- No. 1.—Schedule of surveyors employed, and work executed by them, from July 1, 1905, to December 31, 1905.
- No. 2.—Schedule of surveyors employed and work executed by them, from January 1, 1906, to June 30, 1906.
- No. 3.—Schedule showing for each surveyor employed during 1905, the number of miles surveyed of township subdivision lines, township outlines, traverses of lakes and rivers, and re-survey; also cost of the same.
- No. 4.—List of Dominion land surveyors who have been supplied with standard measures.
- No. 5.—List of lots in the Yukon Territory of which surveys have been confirmed during the year ending June 30, 1906.
- No. 6.—List of miscellaneous surveys in the Yukon Territory of which returns have been received during the year ending June 30, 1906.
- No. 7.—Statement of work executed in the office of the Chief Draughtsman.
- No. 8.—List of sectional maps revised and reprinted from July 1, 1905, to July 1, 1906, on three-mile and six-mile scales.
- No. 9.—Statement of work performed in the survey record office for the twelve months ending June 30, 1906.
- No. 10.—Statement of work executed in the photographic office during the twelve months ending June 30, 1906.
- No. 11.—Statement of work executed in the lithographic office during the twelve months ending June 30, 1906.
- No. 12.—Names and duties of employees of the Topographical Surveys Branch at Ottawa.
- No. 13.—Report of C. F. Aylsworth, D.L.S.
- No. 14.—Report of D. Beatty, D.L.S.
- No. 15.—Report of P. R. A. Belanger, D.L.S.
- No. 16.—Report of E. Bray, D.L.S.
- No. 17.—Report of L. T. Bray, D.L.S.
- No. 18.—Report of R. W. Cautley, D.L.S.; Survey of Sixteenth Base.
- No. 19.—Report of R. W. Cautley, D.L.S.; Survey of Thirteenth Base.
- No. 20.—Report of W. A. Ducker, D.L.S.
- No. 21.—Report of A. Driscoll, D.L.S.
- No. 22.—Report of C. C. Fairchild, D.L.S.
- No. 23.—Report of L. E. Fontaine, D.L.S.
- No. 24.—Report of G. A. Grover, D.L.S.
- No. 25.—Report of E. W. Hubbell, D.L.S.

6-7 EDWARD VII., A. 1907

- No. 26.—Report of A. W. Johnson, D.L.S.
No. 27.—Report of G. J. Lonergan, D.L.S.
No. 28.—Report of C. F. Miles, D.L.S.
No. 29.—Report of W. G. McFarlane, D.L.S.
No. 30.—Report of T. S. Nash, D.L.S.
No. 31.—Report of Geo. Ross, D.L.S.
No. 32.—Report of J. E. Ross, D.L.S.
No. 33.—Report of A. Saint Cyr, D.L.S., for 1905.
No. 34.—Interim Report of A. Saint Cyr, D.L.S., for 1906.
No. 35.—Report of B. J. Saunders, D.L.S.
No. 36.—Report of H. W. Selby, D.L.S.
No. 37.—Report of J. N. Wallace, D.L.S.
No. 38.—Report of James Warren, D.L.S.
No. 39.—Report of M. B. Weekes, D.L.S.
No. 40.—Report of A. O. Wheeler, D.L.S.
No. 41.—Report on the Nakimu caves, by A. O. Wheeler, D.L.S.
No. 42.—Report of W. Thibaudeau, C.E.
No. 43.—Examination papers of the Board of Examiners of Dominion Land Surveyors.
No. 44.—Descriptions of surveyed townships submitted by Dominion Land Surveyors during the year ending June 30, 1906.

I have the honour to be, sir,

Your obedient servant,

E. DEVILLE,
Surveyor General.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE of Surveyors employed and work executed by them from July 1 to December 31, 1905.

Surveyor.	Address.	Description of Work.
Aylsworth, C. F.....	Madoc, Ont.....	Retracement in township 24, range 28; township 28, range 32; township 20, range 33; townships 27 and 29, range 33, all west of the principal meridian; and townships 27 and 29, range 1; township 27, range 2; township 20, range 5, and township 31, range 6, all west of the second meridian. Survey of Doukhobor village in township 31, range 6, west of the second meridian.
Beatty, D.....	Parry Sound, Ont.....	Retracement in townships 49, 50, 51, 52 and 53, ranges 1 and 2; and townships 52 and 53, range 3, all west of the fourth meridian. Traverse in township 55, range 4, west of the fourth meridian.
Bélanger, P. R. A.....	Ottawa, Ont.....	Retracement of east boundary of section 4 in township 19, range 24, west of the second meridian.
Bray, E.....	Oakville, Ont.....	Retracement in township 17, range 1; township 18, range 2; townships 19 and 20, ranges 3, 4, and 5; and township 20, range 6, all west of the principal meridian.
Bray, L. T.....	Amherstburg, Ont.....	Retracement in townships 15 and 16, range 16; townships 18, ranges 21 and 22; townships 10, ranges 31 and 32, all west of the principal meridian. Traverse of the Assiniboine river in sections 2, 10 and 11, township 11, range 21, west of the principal meridian.
Côté, J. L.....	Pakan, Alta.....	Contract No. 13 of 1905. Subdivision of township 61, ranges 15 and 16 west of the fourth meridian.
Deans, W. J.....	Brandon, Man.....	Contract No. 8 of 1905. Subdivision of townships 31 and 32, range 2; townships 31, 32 and 33, range 3; townships 33 and 34, ranges 4, 5, and 6; township 35, range 6, all west of the fourth meridian.
Driscoll, A.....	Edmonton, Alta.....	Survey of 17th base across ranges 8 to 18 inclusive, and part of range 19.
Edwards, Geo.....	Ottawa, Ont.....	Contract No. 10 of 1905. Subdivision of townships 33, 34 and 35, ranges 10, 11, 12 and 13, all west of the fourth meridian.
Fairchild, C. C.....	Brantford, Ont.....	Subdivision in township 24, ranges 8, 9 and 10, and township 25, range 10, all west of the fifth meridian.
Fawcett, Thos.....	Niagara Falls, Ont.....	Contract No. 11 of 1905. Subdivision of township 26, range 8, and township 37, ranges 9, 10 and 11, all west of the second meridian.
Fontaine, L. E.....	Lévis, Que.....	Retracement in township 52, ranges 2 and 3, and township 53, range 3, all west of the fifth meridian.
Francis, J.....	Poplar Point, Man.....	Subdivision in township 37, range 29; township 38, range 30, west of the principal meridian.
Grover, Geo. A.....	Kingston, Ont.....	Retracement in townships 18 and 19, range 1, and townships 19 and 20, range 2, all west of the principal meridian.
Hopkins, M. W.....	Edmonton, Alta.....	Contract No. 15 of 1905. Subdivision of townships 61 and 62, range 11, west of the fourth meridian, and townships 58 to 64, inclusive, range 12, west of the fourth meridian.
Hubbell, E. W.....	Ottawa, Ont.....	Retracement in township 22, ranges 6 and 7, west of the third meridian; and townships 18 and 20, range 17; townships 40 and 45, range 21, and township 45, ranges 22 and 24, all west of the second meridian.
Johnson, A. W.....	Kamloops, B. C.....	Subdivision in townships 7 to 11, inclusive, range 22; townships 4, 5, 6, 8, 9, 10, 11, 12 and 13, range 23; township 15, range 25; townships 15, 16 and 17, range 27; township 18, range 28, all west of the sixth meridian; townships 15 and 20, East Coast meridian, and township 39, west of the coast meridian.
Knight, R. H.....	Bruce Mines, Ont.....	Contract No. 9 of 1905. Subdivision of townships 33, 34 and 35, ranges 7, 8 and 9; township 36, ranges 9 and 10; and township 42, range 10, all west of the fourth meridian.
Laurie, R. C.....	Battleford, Sask.....	Reposting townsite of Battleford.
Lemoine, C. E.....	Beaulieu, Que.....	Contract No. 4 of 1905. Subdivision of townships 27 to 32, inclusive, in ranges 6 and 7, west of the fourth meridian.
Lonergan, G. J.....	Buckingham, Que.....	Retracement in township 49, range 21; township 51, range 22; township 34, range 26; townships 35, 37 and 38, range 28, all west of the fourth meridian, and township 39, range 1, west of the fifth meridian.
MacLennan, A. L.....	Toronto, Ont.....	Contract No. 18 of 1905. Subdivision of townships 49, ranges 15 and 16, west of the second meridian.
McFarlane, W. G....	Toronto, Ont.....	Inspection of surveys, 1905, western section.

6-7 EDWARD VII., A. 1907

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE of Surveyors employed and work executed by them from July 1 to
December 31, 1905.—*Continued.*

Surveyor.	Address.	Description of Work.
McGrandle, H.....	Huntsville, Ont.....	Contract No. 3 of 1905. Subdivision of townships 27 to 32, inclusive, ranges 4 and 5, west of the fourth meridian, and north outline of township 26, range 4, west of the fourth meridian.
Macdonell, J. A. ..	Winnipeg, Man....	Exploration survey of three and a half million acres, grant to the Dominion Government "in that portion of the Peace river district of British Columbia lying east of the Rocky Mountains and adjoining the Northwest Territories of Canada." Plan of parts of the Peace and North-pine rivers received.
Michaud, A.....	Edmonton, Alta....	Contract No. 17 of 1905. Subdivision of townships 53, ranges 8 and 9, west of the fifth meridian.
Miles, C. F.....	Ottawa, Ont.....	Traverses in township 5, range 27; and townships 2 and 3, range 28, west of the fourth meridian, and in township 17, range 2, west of the fifth meridian. Re-survey in township 9, range 27, west of the fourth meridian. Subdivision in townships 1, ranges 27 and 28; townships 1, 2 and 3, range 29, west of the fourth meridian; township 15, range 1; townships 10, 11, 13 and 16, range 2; townships 6 and 7, range 3, and township 7, range 4, all west of the fifth meridian.
Molloy, J....	Winnipeg, Man....	Contract No. 16 of 1905. Subdivision of townships 5, 6, and 8, range 9; townships 5, ranges 10 and 11; townships 1 to 5, inclusive, range 12; township 1, range 13, and township 2, range 14, all east of the principal meridian. Traverse of Roseau river in southwest quarter of section 12, township 3, range 4, east of the principal meridian.
Nash, T. S....	Ottawa, Ont.	Inspection of surveys, 1905, Western Central section.
O'Hara, W. F.	Ottawa, Ont.	Contract No. 6 of 1905. Subdivision of townships 27 to 32, inclusive, ranges 10 and 11, west of the fourth meridian.
Parsons, J. L. R..	Toronto, Ont.,	Contract No. 1 of 1905. Subdivision of townships 3 and 4, ranges 17 and 18; township 5, range 19; townships 5 and 6, ranges 20 and 21; townships 5, 6, 7 and 8, ranges 22, 23 and 24; townships 6, 7 and 8, ranges 25 and 26, all west of the second meridian.
Ponton, A. W.	Macleod, Alta....	Contract No. 7 of 1905. Subdivision of townships 27 to 32, inclusive, ranges 12 and 13, west of the fourth meridian; and township 12, range 13, west of the third meridian.
Proudfoot, H. B...	Toronto, Ont....	Contract No. 2 of 1905. Subdivision of townships 27 and 28, ranges 12 and 13, west of the third meridian; townships 27, 28, 29 and 30, ranges 2 and 3; township 28, range 4, all west of the fourth meridian.
Rinfret, R....	Edmonton, Alta....	Contract No. 5 of 1905. Subdivision of townships 27 to 32, inclusive, in ranges 8 and 9, west of the fourth meridian.
Rinfret, R.....	Edmonton, Alta....	Contract No. 19 of 1905. Subdivision of townships 54, 55 and 56, range 6, west of the fifth meridian.
Ross, Geo.....	Welland, Ont.....	Subdivision in townships 38 and 41, range 18; township 40, range 20; and townships 40 and 41, ranges 23 and 24, west of the second meridian. Township 36, range 12; township 33, range 13; townships 36 and 44, range 14; townships 36 and 40, range 15, and township 43, range 23. Traverse in township 43, range 26, all west of the third meridian. Retracement in townships 31 and 32, ranges 24 and 25; township 32, range 26; township 39, range 28; townships 31 and 32, range 29, all west of the second meridian; and township 39, range 26; township 35, range 27, west of the third meridian.
Ross, Jos. E....	Kamloops, B. C. .	Subdivision in townships 23, 24 and 25, range 20; townships 23, 24 and 26, range 21; township 24, range 22, all west of the fifth meridian; township 23, range 4; township 26, range 7; townships 21, 22 and 23, range 8; townships 20 and 21, range 9; township 22, ranges 10 and 11; township 19, ranges 14, 15, 16 and 17; and township 20, range 16, all west of the sixth meridian.
Roy, Geo. P.....	Quebec, Que	Contract No. 12 of 1905. Subdivision of townships 59 and 60, range 27, west of the fourth meridian, and townships 59 and 60, range 1, west of the fifth meridian.
Saint Cyr, A.....	Ottawa, Ont.	Survey of 19th base across ranges 25 and 26, west of the fifth meridian. The sixth meridian across townships 61, 62, 63 and 64. The 17th base along ranges 22 to 27, inclusive, and 16th base across range 27, all west of the fifth meridian.
Selby, H. W.....	Toronto, Ont.....	Survey of Shaftsbury Settlement, Alta. Survey of 5th meridian along townships 73, 74, 75 and 76. The 20th base across ranges 1 to 26, inclusive, west of the fifth meridian.

SESSIONAL PAPER No. 25b

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE of Surveyors employed and work executed by them from July 1 to
December 31, 1905.—*Continued.*

Surveyor.	Address.	Description of Work.
Thibaudeau, W.....	Hamilton, Ont.....	Exploration survey in connection with water conduit system in the Yukon Territory.
Tyrrell, J. W.....	Hamilton, Ont.....	Contract No. 14 of 1905. Subdivision of townships 59, 60, 61 and 62, range 13, west of the fourth meridian; township 61, east outline of townships 63 and 64, range 14, west of the fourth meridian.
Wallace, J. N.....	Calgary, Alta.....	Survey of 18th base across ranges 4 to 18, inclusive, west of the 5th meridian.
Warren, Jas.....	Walkerton, Ont.....	Retracement in townships 4, 5 and 10, range 25; township 10, range 26; townships 10, 11 and 12, range 27; township 6, range 28; townships 4 and 5, range 29, all west of the second meridian.
Wheeler, A. O.....	Calgary, Alta.....	Topographer of the Department of the Interior in the Rocky mountains; from Field in the Rocky mountains to Beaver-mouth near Donald in the Selkirk mountains.

6-7 EDWARD VII., A. 1907

APPENDIX No. 2 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE of Surveyors employed, and work executed by them from January 1, 1906 to June 30, 1906.

Surveyor.	Address.	Description of Work.
Aylsworth, C. F.....	Madoc, Ont.....	Re-survey of townships in Eastern Manitoba. No returns.
Baker, J. C.....	Vermilion, Alta.....	Contract No. 14 of 1906. No returns
Bélanger, P. R. A.....	Ottawa, Ont.....	Re-surveys near Yorkton, Saskatchewan.
Beatty, D.....	Parry Sound, Ont.....	Re-survey of townships north of Prince Albert and east of Battleford. No returns.
Bolton, L.....	Listowel, Ont.....	Contract No. 3 of 1906. No returns.
Bourgeault, A.....	St. Jean Port Joli, P. Q.....	Contract No. 11 of 1906. No returns.
Bray, L. T.....	Amherstburg, Ont.....	Re-survey of township 11, range 22, west of the fourth meridian.
Carson, P. A.....	Ottawa, Ont.....	Triangulation in the Railway belt, B. C. No returns.
Cautley, R. H.....	Edmonton, Alta.....	Contract No. 16 of 1906. No returns.
Christie, Wm.....	Chesley, Ont.....	Re-survey of township 19, range 3, west of the principal meridian.
Deans, W. J.....	Brandon, Man.....	Re-survey of township 18, range 5, and township 19, range 6, and part of township 19, range 5, west of the principal meridian.
Driscoll, A.....	Edmonton, Alta.....	Contract No. 1 of 1906. Subdivision of part of township 50, range 6, west of the fifth meridian.
Drummond, T.....	Montreal, P. Q.....	Contract No. 17 of 1906. No returns.
Dumais, P. T. C.....	Hull, P. Q.....	Contract No. 9 of 1906. No returns.
Edwards, Geo.....	Ponoka, Alta.....	Contract No. 13 of 1906. No returns.
Fairchild, C. C.....	Brantford, Ont.....	Subdivision of townships north of Banff, Alta. -No returns.
Fawcett, Thos.....	Niagara Falls, Ont.....	Contract No. 20 of 1906. Subdivision of township 56, range 4, west of the fifth meridian.
Fontaine, L. E.....	Levis, P. Q.....	Re-surveys in Central Alberta. No returns.
Grover, G. A.....	Kingston, Ont.....	Retracement survey of part of townships 19 and 20, range 1, and township 20, range 2, west of the principal meridian.
Hawkins, A. H.....	Listowel, Ont.....	Re-surveys in Southern Alberta. No returns.
Holcroft, H. S.....	Toronto, Ont.....	Contract No. 10 of 1906. Subdivision of township 8, range 10, east of the principal meridian.
Hopkins, M. W.....	Edmonton, Alta.....	Contract No. 23 of 1906. Survey of North outline of township 58, range 10 west of the fourth meridian.
Hubbell, E. W.....	Ottawa, Ont.....	Re-surveys in townships 21, ranges 5, 6, and 7 and townships 22, ranges 4 and 5, west of the third meridian.
Johnson, A. W.....	Kamloops, B.C.....	Retracement and traverse in township 5, range 26, west of the sixth meridian and survey of lots 225 and 226, Group 2 in township 19, east of the Coast meridian, also field notes of the re-survey of the townsite of Hope, B.C.
Knight, R. H.....	Bruce Mines, Ont.....	Contract No. 21 of 1906. No returns.
Laurie, R. C.....	Battleford, Sask.....	Re-posting, townsite of Battleford.
Lonergan, G. J.....	Buckingham, P.Q.....	Re-surveys in township 56, range 24, west of the fourth meridian, also sketch shewing work done in the new townsite of Fort Saskatchewan.
Lemoine, C. E.....	Beaulieu, P.Q.....	Contract No. 20 of 1905. Subdivision of townships 55, 56 and 57, range 8, west of the fifth meridian.
Macdonell, J. A.....	Winnipeg, Man.....	Exploration survey of three and a half million acres grant to the Dominion Government "on that portion of the Peace River district of British Columbia lying east of the Rocky Mountains and adjoining the Northwest Territories of Canada." Plan of parts of the Peace and North-pine rivers received.
Michaud, A.....	Edmonton, Alta.....	Contract No. 19 of 1906. No returns.
Miles, C. F.....	Ottawa, Ont.....	Subdivision in township 18, range 3, west of the fifth meridian and sketch shewing the Bow River in township 21, range 27, west of the fourth meridian.
Molloy, J.....	Winnipeg, Man.....	Contract No. 7 of 1906. Subdivision in township 15, range 12, and township 14, range 11, east of the principal meridian.
Molloy, J.....	Winnipeg, Man.....	Contract No. 2 of 1906. Subdivision of township 14, range 12 and portions of townships 13, ranges 12 and 13 and township 14, range 13, east of the principal meridian.
Montgomery, R. H.....	Ottawa, Ont.....	Contract No. 12 of 1906. Subdivision of township 50, range 24, west of the second meridian.
McMillan, Geo.....	Ottawa, Ont.....	Inspector of Survey Contracts.
McFarlane, W. G.....	Toronto, Ont.....	Contract No. 5 of 1906. No returns.
McFee, A.....	Innisfail, Alta.....	Contract No. 22 of 1906. Traverse of Little Red Deer river in township 35, range 2, west of the fifth meridian.
McGrandle, H.....	Huntsville, Ont.....	Contract No. 18 of 1906. No returns.
O'Hara W. F.....	Ottawa, Ont.....	Correction and retracement surveys southeast of Red Deer, Alta. No returns.

SESSIONAL PAPER No. 25b

APPENDIX No. 2 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE of Surveyors employed and work executed by them from January 1, 1906,
to June 30, 1906.—*Continued.*

Surveyor.	Address.	Description of Work.
Parsons, J. L. R.....	Toronto, Ont.....	Contract No. 6 of 1906. Subdivision of township 9, range 9, east of the principal meridian.
Ponton, A. W.....	Macleod, Alta.....	Survey of east boundary of townships 65, 66, 67 and 68, range 13, west of the fourth meridian and survey of the eighteenth base line across ranges 13 to 20 inclusive west of the fourth meridian.
Reilly, W. R.....	Regina, Sask.....	Re-surveys south of Prince Albert, Sask. No returns.
Richard, J. F.....	Ste. Anne de la Pocatière, P.Q.....	Settlement survey at Cumberland House and at Le Pas.
Rinfret, R.....	Edmonton, Alta.....	Contract No. 19 of 1905. Subdivision of townships 54, 55 and 56, range 6, west of the fifth meridian.
Roy, G. P.....	Quebec, P.Q.....	Contract No. 15 of 1906. No returns.
Ross, Jos. E.....	Kamloops, B.C.....	Subdivision in townships 18, ranges 24 and 25; townships 19, ranges 16 and 17 and township 20, range 24; traverse in township 18, range 24, all west of the sixth meridian, also field notes of the Grass Roots' Mineral Claim, lot 1496.
Saint Cyr, A.....	Ottawa, Ont.....	Survey of the eighteenth base line across ranges 20, 21 and 22, west of the fifth meridian.
Saint Cyr, J. B.....	Ste. Anne de la Pérade, P.Q	Survey of the Settlement of Vermilion, Alta. on the Peace river. No returns.
Selby, H. W.....	Toronto, Ont.....	Subdivision of townships 76 and 77, range 14, west of the fifth meridian.
Tyrrell, J. W.....	Hamilton, Ont.	Contract No. 4 of 1906. No returns.
Wallace, J. N.....	Calgary, Alta.....	Survey of the fourteenth base line across ranges 24, 25, 26, 27 and 28, west of the second meridian.
Warren, Jas.....	Walkerton, Ont.	Re-surveys south of Moosejaw, and north of Maple Creek, Sask. No returns.
Wheeler, A. O.....	Calgary, Alta.....	Topographer of the Department of the Interior, surveys from Field in the Rocky Mountains to Beaver Mouth near Donald in the Selkirk Mountains.

APPENDIX No. 3 TO THE REPORT OF THE SURVEYOR-GENERAL.

SCHEDULE showing for each Surveyor employed during 1905, the number of miles surveyed of township sub-division lines, township outlines, traverses of lakes and rivers and re-survey; also cost of the same.

Surveyor.	Miles of Subdivision.	Miles of Outlines.	Miles of Traverse.	Miles of Re-survey.	Total Mileage.	Total cost. \$ cts.	Cost per mile. \$ cts.	By Day Work or by Contract.
Aylsworth, C. F.				253.	253.	7,589 00	30 00	Day.
Beatty, David.				352.	352.	4,564 00	12 96	"
(a)Belanger, P. R. A.						2,661 00		"
Bray, E.				292.	292.	4,088 00	14 00	"
Bray, L. T.			7.	387.	394.	5,457 00	13 85	"
Cautley, R. W.		162.			162.	14,361 00	88 65	"
Côté, J. L.	242.	50.			292.	9,408 48	32 22	Contract.
Deans, W. J.	568.		38.		606.	4,418 50	7 29	"
Driscoll, A.		111.20			111.20	8,200 69	73 75	Day.
Ducker, W. A.		84.			84.	2,761 65	32 88	"
Edwards, Geo.	567.		96.		663.	4,666 00	7 04	Contract.
Fairechild, C. C.	130.		39.		169.	7,955 00	47 07	Day.
Fawcett, Thos.	163.		27.	80.	270.	7,308 00	27 07	Contract.
Fontaine, L. E.	100.		90.		190.	8,125 00	42 76	Day.
Francis, J.	11.				11.	335 40	30 49	"
Grover, G. A.				400.	400.	6,055 00	15 14	"
Hopkins, M. W.	517.11	66.	248.27		831.38	19,010 59	22 87	Contract.
Hubbell, E. W.			6.	411.	417.	8,169 00	19 59	Day.
Johnson, A. W.	117.		58.	5.	180.	8,625 00	47 92	"
Knight, R. H.	588.		100.		688.	5,773 40	8 39	Contract.
Lemone, C. E.	696.33	108.	39.69		844.02	10,175 81	12 06	"
Loneragan, G. J.	353.	76.	73.		502.	8,435 00	16 80	Day.
Miles, C. F.	155.	11.	38.	61.	265.	7,835 00	29 57	"
Michaud, A.	189.79	26.	32.39		248.18	6,745 87	27 18	Contract.
Molloy, John.	568.		1.		569.	16,348 36	28 74	"
(b)McFarlane, W. G.						5,620 00		Day.
McGrandle, Hugh.	575.				575.	4,177 00	7 26	Contract.
MacLennan, A. L.	256.	35.	37.		328.	9,125 59	27 82	"
(b)Nash, T. S.						6,301 00		Day.
O'Hara, W. F.	581.		35.		616.	4,576 00	7 43	Contract.
Ponton, A. W.	732.	24.	2.		758.	5,593 40	7 38	"
Parsons, J. L. R.	1,646.	129.	162.		1,937.	15,172 00	7 83	Contract.
Proudfoot, H. B.	568.	13.	44.		625.	4,470 14	7 15	"
Rinfret, R.	694.	34.	31.		759.	8,789 63	11 58	"
Ross, Geo.			60.	330.	390.	5,955 00	15 27	Day.
Ross, J. E.	73.		50.	8.	131.	8,207 00	62 65	"
Roy, Geo. P.	224.	40.	113.		377.	11,097 84	29 44	Contract.
Saint Cyr, A.		102.			102.	9,412 56	92 28	Day.
Saunders, B. J.		118.70			118.70	12,602 26	106 17	"
Selby, H. W.		176			176.	13,059 00	74 20	"
(c)Thibaudeau, W.			315.		315.	11,039 00	35 04	Contract.

SESSIONAL PAPER No. 25b

Tyrrell, J. W.	229.77	58.	66.93	354.70	8,317.61	23 45	"
Wallace, J. N.		118.		118.	13,606.00	115 30	Day.
Warren, Jas.			67.6	577.60	4,794.00	8 30	"
Weekes, M. B.		49.		49.	3,804.00	77 63	"
	10,544.	1,590.	1,876.88	17,100.78	354,790.18	20 75	

- (a) Supervisor of surveys.
- (b) Inspector of contract surveys.
- (c) Traverse with levels.

Total cost.	\$354,790.18
Total mileage.	17,100.78
Cost per mile.	20.75

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR-GENERAL.

List of Dominion Land Surveyors who have been supplied with Standard Measures.

Name.	Address.	Date of Appointment.	Remarks.
Austin, G. F.	Dewdney, Alta.	April 14, '72.	
Aylen, J.	Aylmer, Que.	May 29, '85.	
Aylsworth, C. F.	Madoc, Ont.	" 17, '86.	
Baker, J. C.	Vermilion, Alta.	" 18, '06.	
Barwell, C. S. W.	Dawson, Yukon Territory.	Aug. 21, '94.	
Bayne, G. A.	Winnipeg, Man.	April 14, '72.	
Beatty, D.	Parry Sound, Ont.	" 14, '72.	
Beatty, W.	Delta, Ont.	" 14, '72.	
Belanger, P. R. A.	Ottawa, Ont.	May 17, '80.	Surveys Staff Dept. of Interior.
Belleau, J. A.	"	" 15, '83.	
Bigger, C. A.	"	March 30, '82.	Astronomer, Dept. of Interior.
Bolton, L.	Listowel, Ont.	April 14, '72.	
Boswell, E. J.	Winnipeg, Man.	Feb. 18, '03.	
Bourgeault, A.	St. Jean Port Joli, Que.	March 29, '83.	
Bourgault, C. E.	"	Feb. 21, '88.	
Bourget, C. A.	Ste. Adelaide de Pabos, Que.	May 14, '84.	
Bowman, H. J.	Berlin, Ont.	Feb. 16, '88.	
Brabazon, A. J.	Ottawa, Ont.	May 12, '82.	
Bray, S.	"	Nov. 14, '83.	Dept. of Indian Affairs.
Bray, E.	Oakville, Ont.	April 14, '72.	
Bray, L. T.	Amherstburg, Ont.	Feb. 18, '03.	
Bridgeland, M. P.	Calgary, Alta.	Mar. 10, '05.	
Brodie, S.	Fort Qu'Appelle, Sask.	April 14, '72.	
Brownlee, J. H.	Victoria, B.C.	" 15, '87.	
Burke, W.	Minnedosa, Man.	" 14, '72.	
Burnet, H.	Victoria, B.C.	June 22, '85.	
Burwell, H. M.	Vancouver, B.C.	Feb. 17, '87.	
Carbert, J. A.	Lacombe, Alta.	May 12, '80.	
Carpenter, H. S.	Regina, Sask.	Feb. 20, '01.	Dept. of Public Works for Saskatchewan.
Carroll, C.	Prince Albert, Sask.	April 14, '72.	
Cautley, R. H.	Edmonton, Alta.	May 1, '05.	
Cautley, R. W.	"	Sept. 2, '96.	
Cavana, A. G.	Orillia, Ont.	Nov. 16, '76.	
Charlesworth, L. C.	Regina, Sask.	Feb. 27, '03.	
Christie, W.	Chesley, Ont.	Mar. 22, '06.	
Cleveland, E. A.	Vancouver, B.C.	June 27, '99.	
Côté, J. A.	Quebec, Que.	May 14, '84.	
Côté, J. L.	Edmonton, Alta.	Mar. 21, '90.	
Cotton, A. F.	New Westminster, B.C.	May 11, '80.	
Craig, J. D.	Ottawa, Ont.	Feb. 24, '02.	
Cummings, J. G.	Calgary, Alta.	" 17, '04.	
Dalton, J. J.	Weston, Ont.	April 17, '79.	Dominion Topographical Surveyor.
Deans, W. J.	Brandon, Man.	May 13, '86.	
Dennis, J. S.	Calgary, Alta.	Nov. 19, '77.	Dominion Topographical Surveyor, Inspector of Irrigation and British Columbia Land Commissioner, C. P.R.
Denny, H. C.	"	April 1, '82.	
Desmeules, J. C.	Murray Bay, Que.	" 14, '72.	
Dickson, H. G.	Whitehorse, Yukon Territory.	May 19, '89.	
Dickson, J.	Fenelon Falls, Ont.	April 14, '72.	
Dobie, J. S.	Regina, Sask.	Mar. 15, '06.	Dept. of Public Works for Saskatchewan.
Doupe, J.	Winnipeg, Man.	April 14, '72.	
Doupe, J. L.	"	Oct. 6, '88.	Asst. Land Commissioner, C.P.R.
Drewry, W. S.	Victoria, B.C.	Nov. 14, '83.	
Driscoll, A.	Edmonton, Alta.	Feb. 23, '87.	
Drummond, T.	Montreal, Que.	June 24, '78.	Dominion Topographical Surveyor.
DuBerger, C. C.	Waterloo, Que.	Nov. 17, '81.	
Ducker, W. A.	Winnipeg, Man.	Mar. 30, '83.	Swamp Land Commissioner.
Dumais, P. T. C.	Hull, Que.	" 29, '82.	
Edwards, Geo.	Ponoka, Alta.	April 14, '72.	
Ellacott, C. H.	Regina, Sask.	Feb. 22, '99.	
Fairchild, C. C.	Brantford, Ont.	" 20, '01.	
Farncomb, A. E.	Red Deer, Alta.	Mar. 12, '02.	
Fawcett, T.	Niagara Falls, Ont.	Nov. 18, '76.	Dominion Topographical Surveyor.
Fawcett, A.	Gravenhurst, Ont.	Feb. 22, '93.	
Fontaine, L. E.	Lévis, Que.	Aug. 13, '92.	
Foster, F. L.	Toronto, Ont.	" 14, '72.	
Francis, J.	Poplar Point, Man.	June 17, '75.	
Garden, J. F.	Vancouver, B.C.	May 13, '80.	
Garden, G. H.	Lethbridge, Alta.	April 14, '72.	
Garden, C.	Winnipeg, Man.	" 14, '72.	
Gauvreau, L. P.	Quebec, Que.	" 14, '72.	
Gibbon, J.	Dawson, Yukon Territory.	Feb. 12, '91.	
Gordon, M. L.	Toronto, Ont.	" 18, '04.	
Gordon, R. J.	Stirling, Alta.	Mar. 12, '02.	
Gore, T. S.	Victoria, B.C.	April 19, '79.	

SESSIONAL PAPER No. 25b

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR GENERAL.—*Con.*List of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.		Remarks.
Green, T. D.	Dawson, Yukon Territory.	May	19, '84.	City Surveyor, Winnipeg.
Grover, G. A.	Kingston, Ont.	Feb.	18, '04.	
Harris, J. W.	Winnipeg, Man.	April	14, '72.	
Harvey, C.	Indian Head, Sask.	Feb.	17, '04.	
Hawkins, A. H.	Listowel, Ont.	Mar.	6, '06.	
Henderson, W.	Chilliwack, B.C.	Nov.	17, '83.	Survey Staff, Dept. of Interior.
Holcroft, H. S.	Toronto, Ont.	Feb.	18, '03.	
Hopkins, M. W.	Edmonton, Alta.	"	20, '01.	
Hubbell, E. W.	Ottawa, Ont.	May	19, '84.	
Irwin, J. M.	Kenora, Ont.	April	14, '72.	
James, S.	Toronto, Ont.	"	14, '72.	Dominion Topographical Surveyor, Astronomer, Dept. of the Interior.
Jephson, B. J.	Winnipeg, Man.	May	12, '80.	
Johnson, A. W.	Kamloops, B.C.	Mar.	12, '02.	
Kirk, J. A.	Revelstoke, B. C.	May	11, '80.	
Klotz, O. J.	Ottawa, Ont.	Nov.	19, '77.	
Knight, R. H.	Bruce Mines, Ont.	Feb.	18, '04.	Director of Surveys, Y. T.
Latimer, F. H.	Detroit, Mich.	"	13, '85.	
Laurie, R. C.	Battleford, Sask.	April	27, '83.	
Lawe, H.	Ottawa, Ont.	"	14, '72.	
Lemoine, C. E.	Quebec, Que.	Mar.	31, '82.	
Lendrum, R. W.	Strathcona, Alta.	May	15, '80.	Dominion Topographical Surveyor, Land Commissioner, Alberta Railway and Coal Co.
Lonergan, G. J.	Buckingham, Que.	Feb.	28, '01.	
Lucas, S. B.	Ponoka, Alta.	April	14, '72.	
Lumsden, H. D.	Ottawa, Ont.	"	14, '72.	
Macpherson, C. W.	Dawson, Yukon Territory.	Mar.	7, '00.	
Magrath, C. A.	Lethbridge, Alta.	Nov.	16, '81.	District Surveyor and Town Engineer.
Malcolm, L.	Blenheim, Ont.	April	14, '72.	
Meadows, W. W.	Maple Creek, Sask.	Feb.	23, '05.	
Michaud, A.	Montreal, Que.	"	18, '03.	
Miles, C. F.	Ottawa, Ont.	April	14, '72.	
Moberly, H. K.	Innisfail, Alta.	Feb.	27, '03.	Dominion Lands Agent, New Westminster.
Molloy, J.	Winnipeg, Man.	April	14, '72.	
Montgomery, R. H.	Brantford, Ont.	Feb.	23, '05.	
Moore, H. H.	Township York, Ont.	"	17, '04.	
McArthur, J. J.	Ottawa, Ont.	"	17, '79.	
McFadden, M.	Neepawa, Man.	"	14, '72.	Inspector of Surveys, Dept. of Interior.
McFarlane, W. G.	Toronto, Ont.	May,	19, '05.	
McFee, A.	Innisfail, Alta.	Feb.	19, '79.	
McGrandle, H.	Huntsville, Ont.	May	30, '83.	
McKenna, J. J.	Dublin, Ont.	April	14, '72.	
McKenzie, J.	New Westminster, B. C.	Nov.	18, '88.	Dominion Topographical Surveyor
McLatchie, J.	Nelson, B. C.	April	14, '72.	
McLean, J. K.	Ottawa, Ont.	"	1, '82.	
McLennan, A. L.	Toronto, Ont.	Feb.	23, '05.	
McMillan, G.	Ottawa, Ont.	"	22, '06.	
McPherson, A. J.	Dawson, Yukon Territory.	"	21, '01.	Dominion Topographical Surveyor
McPhillips, G.	Windsor, Ont.	June	17, '75.	
McVittie, A. W.	Blairmore, Alta.	Mar.	12, '02.	
Nash, T. S.	Ottawa, Ont.	Feb.	18, '04.	
Ogilvie, W.	"	April	14, '72.	
O'Hara, W. F.	"	Feb.	19, '95.	Dominion Topographical Surveyor
Ord, L. R.	Winnipeg, Man.	April	1, '82.	
Parsons, J. L. R.	Toronto, Ont.	Feb.	23, '05.	
Patrick, A. P.	Calgary, Alta.	Nov.	19, '77.	
Pearce, W.	"	May	10, '80.	
Phillips, E. H.	Ottawa, Ont.	Feb.	24, '02.	Dominion Topographical Surveyor
Ponton, A. W.	Macleod, Alta.	May,	18, '81.	
Proudfoot, H. B.	Toronto, Ont.	Mar.	28, '82.	
Rainboth, E. J.	Ottawa, Ont.	May	19, '81.	
Rainboth, G. C.	Aylmer, Que.	April	14, '72.	
Reid, J. L.	Ottawa, Ont.	"	14, '72.	Dominion Topographical Surveyor
Reilly, W. R.	Regina, Sask.	Nov	17, '81.	
Richard, J. F.	Ste. Anne de la Pocatiere, Que.	"	13, '82.	
Rinfret, R.	Edmonton, Alta.	Feb.	20, '00.	
Ritchie, J. F.	Nelson, B. C.	Jan.	7, '89.	
Robertson, H. H.	Montmagny, Que.	April	14, '72.	Dominion Topographical Surveyor
Roberts, S. A.	Victoria, B. C.	May	16, '85.	
Roberts, V. M.	Sturgeon Falls, Ont.	"	17, '86.	
Robinson, F. J.	Regina, Sask.	Feb.	22, '00.	
Rombough, M. B.	Morden, Man.	April	14, '72.	
Rorke, L. V.	Sudbury, Ont.	Aug.	13, '91.	Dominion Topographical Surveyor
Ross, G.	Welland, Ont.	Nov.	21, '82.	
Ross, J. E.	Kamloops, B. C.	Feb.	12, '01.	
Roy, G. P.	Quebec, Que.	Nov.	17, '81.	

6-7 EDWARD VII., A. 1907

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR GENERAL.—*Con.*LIST of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.		Remarks.
Saint Cyr, J. B.....	Ste. Anne de la Perade, Que..	Feb.	17, '81..	
Saint Cyr, A.....	Ottawa, Ont.....	"	17, '87..	
Saunders, B. J.....	Edmonton, Alta.....	Nov.	16, '84..	
Seager, E.....	Kenora, Ont.....	April	14, '72..	
Selby, H. W.....	Toronto, Ont.....	Nov.	15, '82..	
Sewell, H. de Q.....	".....	May	16, '85..	
Shaw, C. A. E.....	Victoria, B. C.....	"	10, '80..	
Speight, Thos.....	Toronto, Ont.....	Nov.	16, '82..	
Starkey, S. M.....	Starkey's P. O., N. S.....	April	14, '72..	
Stewart, G. A.....	Calgary, Alta.....	"	14, '72..	
Stewart, L. B.....	Toronto, Ont.....	Nov.	22, '82..	Dominion Topographical Surveyor, Professor, School of Practical Science, Toronto.
Stewart, E.....	Ottawa, Ont.....	April	14, '72..	Superintendent of Forestry.
Talbot, A. C.....	Calgary, Alta.....	May	13, '80..	
Thompson, W. T.....	Fort Qu'Appelle, Sask.....	Nov.	19, '77..	Dominion Topographical Surveyor.
Tracy, T. H.....	Vancouver, B. C.....	April	14, '72..	City Engineer, Vancouver.
Tremblay, A. J.....	Les Eboulements, Que.....	Feb.	18, '90..	
Towle, C. E.....	Waterloo, Que.....	April	14, '72..	
Turnbull, T.....	Winnipeg, Man.....	Mar.	29, '82..	
Tyrrell, J. W.....	Hamilton, Ont.....	Feb.	16, '87..	
Vaughan, J. W.....	Vancouver, B.C.....	June	11, '78..	
Vicars, J.....	Kamloops, B. C.....	May	17, '86..	
Wallace, J. N.....	Calgary, Alta.....	Feb.	20, '00..	
Warren, J.....	Walkerton, Ont.....	April	14, '72..	
Watt, G. H.....	Ottawa, Ont.....	Feb.	24, '02..	
Weekes, A. S.....	Clinton, Ont.....	"	11, '92..	
Weekes, M. B.....	Ottawa, Ont.....	"	18, '03..	
Wheeler, A. O.....	Calgary, Alta.....	Nov.	21, '82..	Topographer of the Dept. of Interior.
White-Fraser, G. W. R.	Ottawa, Ont.....	Feb.	21, '88..	Dominion Topographical Surveyor.
Wiggins, T. H.....	Regina, Sask.....	"	18, '96..	
Wilkins, F. W.....	Norwood, Ont.....	May	18, '81..	Dominion Topographical Surveyor.
Wilkinson, W. D.....	Toronto, Ont.....	Feb.	22, '93..	
Woods, J. E.....	Frank, Alta.....	Nov.	14, '85..	

SESSIONAL PAPER No. 25b

APPENDIX No. 5 TO THE REPORT OF THE SURVEYOR-GENERAL.

List of lots in the Yukon Territory of which surveys have been confirmed during the year ending June 30, 1906.

GROUP No. 2.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
100	50.52	T. D. Green.....	1905	June 4, '06	Messrs. Cullen & Green.
180	45.18	C. S. W. Barwell.....	1906	" 8, '06	Capt. T. Halcock.
250	36.3	A. J. McPherson.....	1905	Oct. 13, '05	J. L. Bell, attorney for the Violet Mines, Ltd.
251	48.8	"	1905	" 13, '05	"
252	46.3	"	1905	" 13, '05	"
253	51.3	"	1905	" 13, '05	"
254	8.6	"	1905	" 13, '05	"
255	5.0	C. W. MacPherson.....	1906	June 22, '06	A. Lesprance.
256	2.5	"	1906	" 28, '06	W. F. Barrett.
306	50.19	C. S. W. Barwell.....	1905	May 14, '06	The Dawson City Quartz Company, Ltd.
307	48.76	"	1905	" 14, '06	"
308	51.27	"	1905	" 14, '06	"
309	51.58	"	1905	" 14, '06	"
310	51.60	"	1905	" 14, '06	"
311	51.65	"	1905	" 14, '06	"
312	48.42	"	1905	" 14, '06	"
313	49.13	"	1905	" 14, '06	"
314	51.65	"	1905	" 14, '06	"
315	16.00	"	1905	" 14, '06	"
316	51.65	"	1905	" 14, '06	"
317	49.19	"	1905	" 14, '06	"
318	12.41	"	1905	" 14, '06	"
319	31.70	T. D. Green.....	1905	July 6, '05	L. A. Herdt.
329	43.66	"	1905	Oct. 17, '05	"
330	45.00	C. S. W. Barwell.....	1905	" 31, '05	Wm. White, Arthur Davey and H. S. Tobin.
331	45.00	"	1905	" 31, '05	"
332	37.5	"	1905	" 31, '05	"
341	51.65	T. D. Green.....	1905	" 31, '05	I. J. Givens.

GROUP No. 3.

28	51.65	T. D. Green.....	1905	Dec. 21, '05	Koth & Svatonsky.
----	-------	------------------	------	--------------	-------------------

GROUP No. 5.

65	51.65	H. G. Dickson.....	1905	Oct. 31, '05	Alphonse Larose.
70	46.21	"	1905	" 31, '05	A. B. Palmer et al.

GROUP No. 6.

17	160.00	H. G. Dickson.....	1905	Feb. 7, '06	G. A. Singer.
18	160.00	"	1905	" 7, '06	"
19	100.56	"	1905	Mar. 6, '06	Capt. P. Martin.

GROUP No. 11.

6	160.00	T. D. Green.....	1905	Oct. 31, '05	F. X. & I. S. Laderoute.
7	159.79	"	1905	" 31, '05	"

APPENDIX No. 6 TO THE REPORT OF THE SURVEYOR-GENERAL.

List of miscellaneous surveys in the Yukon Territory of which returns have been received during the year ending June 30, 1906.

Description of Survey.	Surveyor.	Year.
Caribou creek and Lion gulch, base line.....	H. G. Dickson.....	1905
Eureka creek, Right and Left forks, base line.....	Jas. Gibbon.....	1904
Flat creek and Isaacs gulch, base line.....	C. W. MacPherson.....	1902
Bullion creek, base line.....	H. G. Dickson.....	1905
Frooks concession.....	A. J. McPherson.....	1905

APPENDIX No. 7 TO THE REPORT OF THE SURVEYOR-GENERAL.

STATEMENT of work executed in the Office of the Chief Draughtsman.

Returns of surveys examined:—	
Township subdivision.....	536
Township outlines.....	154
Mineral claims.....	93
Correction and other miscellaneous surveys.....	55
Township plans completed for printing.....	444
Preliminary township plans prepared.....	245
Proofs of plans examined.....	494
Outline sketches prepared.....	1,092
Plans of Yukon lots received.....	36
Plans of miscellaneous Yukon surveys received.....	5
Tracings of Yukon survey plans made.....	27
Sectional maps revised but not reprinted.....	6
Sectional maps revised and reprinted.....	21
Sectional maps printed—6 miles to 1 inch.....	82
Sectional maps printed—3 miles to 1 inch.....	25
Declarations of settlers received.....	248
Progress sketches received and filed.....	607
Miscellaneous plans and tracings made.....	644
Applications for various information dealt with, about.....	801
Field books received from record office and used in connection with office work.....	3,875
Plans received from record office and used in connection with office work.....	847
Reference traverses reduced to scale of 40 chains to 1 inch.....	75
Reference traverses drawn on group plans of Yukon Territory.....	75
Mineral claims plotted on group plans of Yukon Territory.....	147

SESSIONAL PAPER No. 25b

APPENDIX No 8 TO THE REPORT OF THE SURVEYOR-GENERAL.

List of Sectional Maps revised and reprinted from July 1, 1905, to July 1, 1906, on three mile and six mile scale.

No. 11 Yale.	No. 216 Sullivan Lake.
" 14 Pincher Creek.	" 217 Tramping Lake.
" 23 Emerson.	" 218 Saskatoon.
" 24 Lake of the Woods.	" 220 Nut Mountain.
" 61 Lytton.	" 265 Peace Hills.
" 111 Kamloops.	" 266 Ribstone.
" 112 Sicamous.	" 269 Prince Albert South.
" 116 Rainy Hills.	" 315 Edmonton.
" 168 Elbow.	" 316 Vermilion.
" 169 Touchwood.	" 219 Humboldt.
" 215 Red Deer.	

APPENDIX No. 9 TO THE REPORT OF THE SURVEYOR GENERAL.

STATEMENT of work performed in the Survey Records Office during the 12 months ending June 30, 1906.

Files received and dealt with	7,073
Letters drafted.. . . .	3,081
Reports and draft memos. to Council.. . . .	2
Plans, tracings, &c., copied and compiled.. . . .	412
Statutory declarations copied and mailed.. . . .	436
Plans sent to agents, registrars, &c.. . . .	18,714
Pages of field notes copied.. . . .	777
Prints of plans received and stored.. . . .	80,587
Original plans received and recorded.. . . .	837
Original field books received and recorded.. . . .	737
Letters written to agents, registrars, &c.. . . .	1,452
Registered parcels mailed.. . . .	1,178

Work done for Topographical Surveys Branch.

Books searched for.. . . .	4,896
Books sent.. . . .	3,875
Books returned.. . . .	3,057
Plans searched for.. . . .	1,029
Plans sent.. . . .	847
Plans returned.. . . .	133
Volumes sent	50
Volumes returned.. . . .	38

In May, 1906, this branch of the Department of the Interior was moved from its former office in the top story of the Langevin Block to the Canadian Building on Slater street, necessitating thereby the removal of 12,000 original plans and 8,302 original field books, placing a serious responsibility on the staff of this branch from the liability of losing some of the valuable records stored in this office, while in transit. This danger was somewhat obviated by packing everything carefully for the men and teams moving the records, and having a thorough and careful check on the books, plans, &c., on their arrival in the new office.

6-7 EDWARD VII., A. 1907

It is found that everything has been put into place in the new building, apparently without any loss, and with very small delay in the working of the branch.

I have to report that during the month of April four men of the official staff were working continuously on information in connection with the Commissioner's Branch, getting out information for the plans to accompany the instructions sent the new sub-agents of Dominion Lands. These plans were made on index township sheets mounted together so as to show each sub-agent's district on a scale of one mile to an inch on which the land available for entry in each sub-agency is shown. The plans were prepared from the books of the Patents Branch, giving information to the date of issue.

For about eight months of this year one of the staff of this branch was assisting Mr. R. E. Young, in getting information from the books in the Patents Office for the map showing even sections disposed of.

C. J. STEERS,
In charge of Survey Records.

APPENDIX No. 10 TO THE REPORT OF THE SURVEYOR GENERAL.

STATEMENT of work executed in the Photographic Office during the twelve months ending June 30, 1906.
FOR THE DEPARTMENT OF THE INTERIOR.

	4 x 5.	5 x 7.	8 x 10.	10 x 12.	11 x 14.	16 x 18.	18 x 20.	24 x 30.	30 x 36.	36 x 42.	42 x 48.	Total.
Wet plate negatives.....		37	99	.....	72	594	77	.....	.....	.....	.....	879
Zinc transfers.....				.....	8	.....	629	.....	.....	.....	.....	637
Dry plate negatives.....	293	42	6	.....	18	.....	.....	.....	.....	.....	.....	359
Bromide prints.....	4	78	16	7	434	.....	85	40	52	3	2	721
Vandyke prints.....		23	45	23	225	.....	110	144	12	21	6	609
Silver prints.....	1,158	3,277	118	.....	7	.....	2	.....	.....	.....	.....	4,562
Total.....	1,455	3,457	284	30	764	594	903	184	64	24	8	7,767

FOR THE GEOLOGICAL SURVEY.

	4 x 5.	5 x 7.	8 x 10.	10 x 12.	11 x 14.	16 x 18.	18 x 20.	24 x 30.	30 x 36.	36 x 42.	42 x 48.	Total.
Wet plate negatives.....			4	.....	1	9	.....	.....	.....	.....	.....	14
Dry plate negatives.....	124	326		.....	.....	.....	.....	.....	.....	.....	.....	450
Bromide prints.....				.....	33	.....	.....	.....	.....	.....	.....	33
Silver prints.....	138	424		.....	.....	.....	.....	.....	.....	.....	.....	562
Total.....	262	750	4	.....	34	9	.....	.....	.....	.....	.....	1,059

6-7 EDWARD VII., A. 1907

APPENDIX No. 11 TO THE REPORT OF THE SURVEYOR GENERAL.
STATEMENT of work executed in the Lithographic Office, during year ending
June 30, 1906.

Month.	Maps.		Townships.		Forms.	
	No.	Copies.	No.	Copies.	No.	Copies.
1905.						
July			39	3,900	3	2,000
August.....	8	240	64	6,400	7	2,074
September.....	5	1,600	40	4,000	3	1,700
October.....	32	10,320	11	1,100	5	11,550
November.....	11	7,200	44	4,400	3	4,000
December.....	16	2,425	20	2,000	7	4,900
1906.						
January.....	7	3,560	48	4,800	3	1,150
February.....	3	850	42	4,200	2	1,700
March.....	32	9,750	30	3,000	9	2,440
April.....	5	1,500	26	2,600	6	1,900
May.....	12	3,650	51	5,100	8	2,440
June.....	14	5,950	29	2,900	3	312
Total.....	145	47,045	444	44,400	59	36,166

SUMMARY OF WORK FOR THE YEAR.

	Number.	Copies.	Impressions.	Cost.	Cost per map or form.
				\$ cts.	\$ cts.
Maps	145	47,045	72,295	3,611 95	24 91
Townships.....	444	44,400	47,500	3,031 51	6 58
Forms	59	36,166	37,816	646 64	10 96
Total.....	648	127,611	157,611	7,290 11	

APPENDIX No. 12 TO THE REPORT OF THE SURVEYOR GENERAL.

NAMES and Duties of Employees of the Topographical Surveys Branch at Ottawa.
(Metcalf Street, Corner of Slater Street.)

Name and duties.

Deville, E., D.T.S., LL.D., Surveyor-General.

CORRESPONDENCE AND ACCOUNTS.

Brady, M., Secretary.

Hunter, R. H., Accountant.

Campbell, G. B., Stenographer and Typewriter.

Percival, M. F., Stenographer and Typewriter.

Cullen, M. J., Stenographer and Typewriter.

Pegg, A., Messenger.

Ellis, F. T., Messenger.

SESSIONAL PAPER No. 25b

OFFICE OF THE CHIEF DRAUGHTSMAN.

Name and duties.

Symes, P. B., Chief Draughtsman.

Shanks, T., B.A.Sc., D.L.S., Assistant to Chief Draughtsman.

First Division.—Instructions and General Information.

Watt, G. H., Grad. S.P.S., D.L.S., in charge of division.

Stacey, A. G., B.A., D.L.S.

Brown, T. E., B.A.

Sylvain, J.

Green, W. T., B.A.

Durnford, F. G. D.

Clunn, T. H. G.

Mackie, F. H., B.Sc., D.L.S.

Weekes, M. B., B.A.Sc., O.L.S., D.L.S.

Mackenzie, H. A.

Mudie, J. M., Grad. R.M.C.

Carroll, M. J., Grad. S.P.S.

Second Division—Examination of Surveyors' Return.

Phillips, E. H., Grad. S.P.S., D.L.S., in charge of division.

Smith, C. C., B.A., D.L.S.

Nash, T. S., Grad. S.P.S., D.L.S.

Empey, J., B.A.Sc., D.L.S.

Henderson, F. D., Grad. S.P.S., D.L.S.

Umbach, J. E., Grad. S.P.S.

Barber, H. G., Grad. S.P.S.

Burgess, E. L., Grad. S.P.S., O.L.S., D.L.S.

Hill, S. N., Grad. S.P.S.

Dennis, E. M., B.Sc.

Elder, A. J., Grad. S.P.S.

Morrier, J. E.

Chilver, H. L., Grad. S.P.S.

McClennan, W. D.

Cram, A.

Cumming, A. L., B.Sc.

Owen, R. B., B.A., B.E.

Davies, T. A., D.L.S.

Elwell, W., Grad. S.P.S.

Roger, A.

Crawford, W., C.E., D.L.S., M.I.C.E., M. Can. Soc. C.E.

Third Division—Drawing Plans for Printing.

Engler, Carl, B.A., D.L.S., in charge of division.

O'Connell, J. R.

May, J. E.

Seymour, H. L., Grad. S.P.S., D.L.S.

Archambault, E.

Helmer, J. D.

Taggart, C. H.

Moule, W. J.

Bergin, W.

Grey, G. A.

Perrin, V.

Williams, E. R.

Davies, T. E. S.

6-7 EDWARD VII., A. 1907

(185 Sparks Street.)

Fourth Division—British Columbia Surveys.

Name and duties.

Rowan-Legg, E. L., in charge of division.
 Gillmore, E. T. B., Grad. R.M.C.
 Carson, P. A., B.A., D.L.S.
 Lawe, H., D.L.S.
 Morley, R. W., Grad. S.P.S.
 MacIlquham, W. L., B.Sc.
 Robertson, D. F., Grad. S.P.S.

Fifth Division—Mapping.

Smith, Jacob, in charge of division.
 Begin, P. A.
 Lepage, J. B.
 Blanchet, A. E.

OFFICE OF THE GEOGRAPHER.

(Woods Building, Slater Street.)

White, J., geographer.
 Baine, H. E., draughtsman.
 Chalifour, J. E., draughtsman.
 Dumouchel, G. E., draughtsman.
 Sharon, M. W., draughtsman.
 Tache, H., draughtsman.
 Darrach, M., draughtsman.
 Wilson, H. W., draughtsman.
 Akerlindh, A., draughtsman.
 Anderson, W., draughtsman.
 Blatchley, H. M., draughtsman.
 Bennie, J., draughtsman.
 Wood, C. G., draughtsman.
 Craig, R. W., draughtsman.
 MacElligott, J. P., draughtsman.
 Chandler, S., draughtsman.
 Groulx, A., draughtsman.
 Gagnon, J. S., draughtsman.
 Waine, Mrs. D. E., stenographer and typewriter.

SURVEY RECORDS OFFICE.

(Canadian Building, Slater Street.)

Steers, C. J., clerk in charge.
 Currie, P. W., B.A., B.Sc., D.L.S., assistant clerk in charge.
 Surtees, W. S., draughtsman.
 Sowter, T. W. E., draughtsman.
 Smith, F. W., draughtsman.
 Routh, C. F., draughtsman.
 Ashton, A. W., draughtsman.
 Lecourt, Eugene, draughtsman.
 Moore, R. T., draughtsman.
 Lambart, O. H., draughtsman and typewriter.
 Yielding, Miss A., typewriter.
 Landry, Narcisse, messenger.

SESSIONAL PAPER No. 25b

LITHOGRAPHIC OFFICE.

(Metcalf Street, corner of Slater Street.)

Name and duties.

Moody, A., foreman.
 Thicke, H., power press printer.
 Bergin, J., transferrer.
 Higgerty, H. J., stone polisher.
 Villeneuve, E., press feeder.
 Thicke, C., engraver and lithographer.

PHOTOGRAPHIC OFFICE.

(Metcalf Street, corner Slater Street.)

Topley, H. N., photographer in charge.
 Carruthers, H. K., photo-lithographer and photo-engraver.
 Woodruff, J., photographer.
 Whitcomb, H. E., photographer.
 Morgan, W. E., photographer.
 Kilmartin, A., photographer.
 Devlin, A., photographer.

GEOGRAPHIC BOARD.

(Woods Building, Slater Street.)

Whitcher, A. H., D.L.S., secretary.

APPENDIX No. 13 TO THE REPORT OF THE SURVEYOR GENERAL.
 REPORT OF C. F. AYLSWORTH, D.L.S.

RESURVEYS IN MANITOBA AND EASTERN SASKATCHEWAN.

MADOC, February 14, 1906.

E. DEVILLE, Esq., LL.D.,
 Surveyor General,
 Ottawa.

SIR,—I have the honour to inform you that I left Madoc on the 10th of April last, pursuant to instructions from you, dated the 6th day of April, 1905, and after organizing a party in Winnipeg, arrived and camped on section 16, township 24, range 28, west of the principal meridian. I will not prolong this report with a description of the phenomenal growth, development and expansion that is everywhere observable throughout the journey between Winnipeg and Russell, nor will I dwell upon the pervading optimism and confidence in the future success of the country. Each settler immediately impresses upon one his pleasure and gratification in the fact that he has been especially favoured by being enabled to secure a homestead in the only 'banana belt' of the West—to such an extent is each settler enamoured of his particular district. And well they should be, for certainly the climatic conditions and results last season were such as to gladden the hearts of even the most pessimistic.

In 'ye olden' times it was the proper thing and popular with the ranching element of the West to discourage prospective agriculturists from encroaching upon their self-constituted preserves, by picturing to them their localities as being particularly inhospitable to the farmer. The bluffing rancher now frightens them away by

6-7 EDWARD VII., A. 1907

such remarks as that they would be frozen out, haled out and eaten out by grasshoppers, and other disheartening calamities would only be their portion. And although the soil could be surpassed, and the landscape is pleasing and ideal to the farmer, the ranchers' plan of campaign certainly was successful for a great many years throughout the many districts which we were instructed by you to visit during the past season's operations, thus placing them under a cloud, and prospective settlers were timid of locating in them. But there came a time when rifts here and there appeared in the clouds, caused by the inrush of the Doukhobors into the Kamsack, Thunder Hill, Yorkton and Devil's lake districts. These districts had been placed under the ban so efficiently by the rancher that people described the Doukhobors as 'tenderfeet'; that they had selected a poor district; that they did not know good land when they saw it; and that they would be forced out. The result was that the Doukhobors proved all these statements to be unfounded to such an extent that people now are anxious to get land all around the Doukhobors' reserve, and some would even go so far as to accept a quarter inside the reserve. I must frankly confess that after seeing the extraordinary successful mixed crops produced in those various districts last season I heartily sympathize with the people in their desire to locate in these fair districts, because nowhere else could such crops as they had in those districts last year be excelled. When one reflects that ten years ago these districts were pronounced inhospitable to the agriculturist, one is amazed at the transformation, and inclined to suggest the absurdity of such a pronouncement.

Another feature in the development of the resources of the west is the construction of the Grand Trunk Pacific railway. As a rule people are always anxious to secure more railways, and the individual member of the community wants more railways, but he always wants the railway to run through the other fellow's farm. But in the case of the Grand Trunk Pacific railway every one is almost frantically desirous of securing the road, and none would object to having it run through his or her farm. Another proof of the desire of the people for this road, to my mind, is, the fact that the right of way purchasers are settling with the owners of land through which the railway passes upon very reasonable terms.

I made a retracement of the lines around sections 16, 17 and 21, in township 24, range 28, west of the principal meridian. Our lines did not 'fall in very pleasant places' while we were occupied at this work, as we were compelled to cross Shell river many times while the water was nearly at freshet height. We completed the retracement of the above-named sections on the 15th of May and left for township 20, range 33, west of the principal meridian, where we arrived and camped on section 23 on the 18th and proceeded with the retracement and restoration survey of that township. Cutarm creek runs in a deep ravine in a southeasterly direction through the northeast corner of this township. Many beaver find an unmolested abiding place in this creek. The settlers, although many of them were originally foreigners, take a special interest in the protection of these valuable fur-bearing souvenirs. Some of the settlers, though, through whose lands this creek runs complain bitterly that they lose large quantities of hay by reason of these busy pioneers damming up the creek and flooding their hay meadows. I was told, though I cannot vouch for the accuracy of the information, that some of the settlers thus damaged are asking the Northwest government for compensation. The beaver appear to be new-comers here, as all their work is of recent date.

The interior and south boundary lines of this township were found to be very irregular, but the settlers did not desire any alteration of them, so I restored all the old corners found and established the lost corners from and according to them. The lands are all taken up and are rapidly being occupied by *bona fide* settlers. The Grand Trunk Pacific railway runs almost square across this township, and it appears to be an ideal line. By the stakes I saw planted, I concluded a station or siding would be located where the line crosses the side road between sections 1 and 12. Apparently great care has been exercised in the selection of this line, as I observed

SESSIONAL PAPER No. 25b

three lines have been surveyed, about twenty chains apart, the middle one of which has been adopted. At one place on section 10 the line goes through a hill that will require a cutting of probably twenty-five feet, which would have been avoided by a detour of probably 150 feet. We completed the survey of this township on the 28th of June, and the next day left for township 27, range 1, west of the second meridian, and on the 30th arrived there and camped between sections 2 and 3 on the south boundary. Your instructions to me regarding this boundary read: 'In township 27, range 1, west of the second meridian, the east and west outlines and the easterly half of the south outline are to be retraced and quarter-section corners established. The quarter-section monuments shown in green on the accompanying plan of the township were cancelled by Order in Council in 1891. If no objection is made by owners or occupants, you are to destroy these posts, and to establish the quarter-section corners midway between the section corners on these lines. Quarter-section lengths in township 27, range 33, west of the principal meridian and in township 27, range 2, west of the second meridian closing on these outlines are to be retraced.' This, as the field notes returned will show, I have done; and they show that according to my chainage the quarter-section corners on the south boundaries of sections 1, 2 and 3 are not as much in error as the plan of this township shows; in fact, my chainage would indicate that they were planted practically in their correct positions.

On July 7 we moved camp to the southwest quarter of section 19 of this township and completed the retracement of the west boundary and the quarter section lines closing thereon, according to your instructions. Although there is considerable broken land in this township, wet land and more than the usual amount of alkali, all the township is occupied by a good class of settlers, Canadian, English, German and Galician. In the township adjoining to the west the settlers are exceptionally prosperous and progressive, one of them, Mr. Alex. Weinmaster, having a forty-horse power steam plough and disc attachment. Many of the road allowances are graded up, and have a network of telephones connecting with Yorkton. Another point may be noted to show that the best is none too good for these settlers, that they are not only attending to the spiritual and material features of their welfare, but they are also attending to the educational interests of the rising generation; and this statement applies to not only this particular school district, but to the surrounding districts as well. They secure the very best teachers that the limited means at their command will permit. This year many of the schools were fortunate in obtaining the services of B.A.'s and M.A.'s, young lady graduates of Queen's University, who delighted in the experience of going west for the summer months. This sprinkling of the finished product of this university of such national repute certainly exercises a decidedly beneficial influence in districts so fortunate as to secure them, from an educational and social point of view. In the car we occupied going into Winnipeg there were four or five graduates of this university; and just to reflect that seven or eighty years ago the quietude in these districts was only disturbed by the yapping of the coyote. On the 15th of July we completed the lines you instructed me to survey at the west boundary of township 27, range 1, west of the second meridian, and on the 17th moved camp to section 22, township 28, range 32, west of the principal meridian, in which township I was instructed to make a complete retracement and restoration survey. William MacDonald, postmaster and a ranching farmer, living on the banks of Stony creek on section 6, township 28, range 31, west of the principal meridian, for twenty-five years, when he met us asked me, 'What are you doing here now—are you the forerunner of another boom? When you were here before everything was stagnant and land was of no value; now it is selling at from \$15 to \$25 per acre.' Here again progress, confidence and optimism are in the air. We are now in the land of the Doukhobors, where we constantly hear the whistle of his forty-horse power steam plough. The settlers round about here assert that for some reason the Doukhobor has suddenly got a move on; that they have done more land breaking this year than they have in the previous three years. They have purchased some fifteen of

6-7 EDWARD VII., A. 1907

those forty-horse power steam ploughs and distributed them amongst their fifty odd villages. It is said that each of these ploughs will break about twenty-five acres per day, but I think in actual practice, on account of delays for water, fuel and breakage that they average from ten to twelve acres per day of from ten to twelve hours. Then they have many smaller engines in use for threshing, grist and saw-milling purposes. They also have superior horses, which they keep in a model condition.

I made a complete retracement and restoration survey of this township, excepting that I found the meridian forming the east boundary of sections 14, 23, 26 and 35 to be very much in error as shown in my notes of this township, I therefore ran a new line for this boundary connecting the northeast angle of section 35 by a straight line with the northeast angle of section 11, and divided the distance equally between the quarter-sections contained (having first destroyed all the originals on this line), and established new corners. I also destroyed all the old corners found on the different side roads, one-half a mile east and west from this meridian, previous to the establishment of new quarter-section corners according to instructions. I found that the original survey of the balance of the township had been fairly well made, so I did not move any more of the original corners. I found that sections 31, 30, 19, 18, 7 and 6 had been resurveyed not many years ago.

The Doukhobors are now building new villages to substitute the ones in which they are now residing. The houses they are living in now are the original ones they built in a makeshift manner to cover themselves and their belongings temporarily. They are now erecting very neat and comfortable ones. They are also building large barns, granaries and buildings for storing their machinery. Timber and lumber for all these structures must be drawn by sleighs in the winter, in some cases very long distances, and of course as settlement proceeds, is becoming scarce. Recognizing this the Doukhobor company have established a large brick manufacturing yard where last year they produced about one and one-half million bricks; they are also manufacturing cement circular bricks for curbing wells. The machinery for all this is purely Canadian, being purchased at Parkhill, Ont. They shipped small quantities of these brick to neighbouring towns along the Canadian Northern railway, and the balance they utilized themselves. This brickyard was located two miles south of Veregius siding on the Canadian Northern railway; but the first year's experience convinced them that their yard had been located too far from the station, and that their present equipment was altogether inadequate to meet the present and future demands. So the day we passed Veregius siding en route to Devil's lake the Doukhobors broke sod for a new brickyard just at the siding. Where building timber is scarce they propose building their new houses of brick. In every village they are erecting a large building which they told me was to be used for a church and school. They have telephone poles on the ground, and it is said they propose connecting all their villages with a telephone system. Conditions on the western prairie would appear to be favourable to the Doukhobors, as they certainly present a very healthy appearance, men, women and children, especially until they arrive at the age of forty, and vegetarians as they are, it is a mystery how the women especially maintain such robust physiques and rosy complexions while performing the arduous work they do. We completed the survey of township 28, range 32, west of the principal meridian, on the 14th of August, and on the 15th left for township 20, range 5, west of the second meridian, and returned and camped on section 13, township 29, range 33, west of the principal meridian, on the 24th of August. During this expedition the wheat was turning ripe, and in places they were beginning to cut. The wheat in this district was certainly remarkable for its excellence. We completed the survey of the last mentioned township on September 2, being delayed a few days in the work through sickness caused by bad water. On the 4th September we moved to the southeast quarter of section 22, township 29, range 1, west of the second meridian, and completed a retracement and restoration survey of this township on October 18.

Our post office during this work was Kamsack, a divisional point on the Canadian Northern railway, which on account of the exceptional fertility of the soil in the

SESSIONAL PAPER No. 25b

surrounding territory is destined to be a town of considerable importance. I understand a portion of the Cote Indian reserve, in which Kamsack is situated, has been surrendered by the Indians, and will be subdivided and sold, which will add considerably to the commercial prosperity of the town and contribute to a betterment in many respects.

Better facilities are now afforded to the travelling public than in 'ye olden' times when we were compelled to ford Assinboine river with great danger to man and beast, by the three steel bridges recently thrown across that river, one where the Yorkton-Crowstand trail crosses, one at Kamsack, and one at Fort Pelly.

After making a correction survey of sections 13, 24, 25, 36, 35, 26, 23 and 14, township 28, range 32, west of the principal meridian, we left and arrived at section 23, township 31, range 6, west of the principal meridian, on Saturday, October 28, where we were to survey a Doukhobor village and road therefrom on the northwest quarter of that section. As directed, previous to proceeding with this survey, I communicated with the Commissioner of Immigration, J. Obed Smith, Esq., who replied that he could not visit this Doukhobor village with me, but he recommended me to Mr. Buchanan, who was acquainted with the conditions and would direct me. I found Mr. Buchanan and he gave me valuable assistance.

One hears frequently remarked that on account of the scarcity of building timber material it is impossible to keep agricultural machinery under cover while not in use, but I observed a very serviceable and economically constructed structure for that purpose built by a Doukhobor named Ivan Schoukin in this Doukhobor village of Resbyhilwa, being a wedge-shaped enclosure with poplar saplings for rafters and thatched roof and gables. We completed the survey of this Doukhobor village and road therefrom on November 4 and left and visited township 20, range 33, west of the principal meridian and completed on Saturday, November 11; and left Saltcoats for Winnipeg on the 13th, and I arrived home on the 21st after a very successful season's operations. Although we had considerable wet weather during the season we were not delayed much on that account.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) F. C. AYLSWORTH, JR., D.L.S.

APPENDIX No. 14, TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF DAVID BEATTY, D.L.S.,

RESURVEYS IN ALBERTA.

PARRY SOUND, May, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR.—I have the honour, in accordance with my instructions, to submit the following report on the resurvey of townships 49, 50, 51, 52 and 53, in ranges 1 and 2, west of the fourth meridian, and townships 52 and 53, in range 3.

I organized my party in Battleford and drove over a very good wagon road to Lloydminster, the greater part of which village is on the east side of the fourth meridian in township 50, the road allowance along said meridian is one of the village streets. The Canadian Northern railway reached the village in August last, and in November, when I came in from my survey, I think there were twice as many buildings either up or being built as there were in the spring when I first reached the village. I commenced my survey in township 49, range 1, the eastern portion of which

6-7 EDWARD VII., A. 1907

is fairly well settled and all apparently well satisfied with their locations. The greater part of the land seemed to be taken up, judging by the small patches of breaking I saw where there were no houses, and the same remark will apply to townships 50 and 51, ranges 1 and 2. The south and west parts of township 49, range 2 are very hilly and better adapted to grazing than agricultural purposes. Townships 51 and 52, ranges 1 and 2 are well suited for farming purposes. The soil is mostly a black loam on top, with clay subsoil. I noticed in the harvest season that the grain on sandy loam land ripened several days earlier than that on the deep black loam, although it had been put in, in some cases, later. Vermilion river passes through the west sides of townships 52 and 53, range 3 in a valley about one hundred feet deep and about one mile wide, and while the soil in these townships is generally good and well suited for farming the west side is better suited for grazing or ranch purposes on account of the excellent shelter afforded for stock in the river valley where there are bluffs of timber and good grass. Township 53, in ranges 1 and 2 are well suited for grazing or ranch purposes. The soil is generally light. There is plenty of good water and hay land with bluffs of poplar timber. The northern parts of the townships are hilly. There is no settlement in township 52, range 1, although the greater part of the township is well suited for agricultural purposes. Township 52, range 2 has several settlers, but a considerable portion of the township is unoccupied, although well suited for agricultural purposes. While there is considerable alkaline water in the townships I have reported on, I found plenty of fresh water, and nearly all of the settlers who have dug wells found good water.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) DAVID BEATTY.

APPENDIX No. 15 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF P. R. A. BELANGER, D.L.S.

SUPERVISION OF SURVEYS IN MANITOBA, SASKATCHEWAN AND ALBERTA.

OTTAWA, February 15, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my actions as Supervisor of Surveys during 1905.

My duties in that capacity were to help surveyors in charge of day work in organizing their transport outfits, and to take general charge of survey equipments and dispose of them on behalf of the department.

I was also authorized to report on the necessity of making various surveys which might be applied for during the season, and also to investigate into disputes arising about surveys and make the best arrangement possible under the circumstances.

In compliance with your instructions, I left Ottawa on April 20, and proceeded to Yorkton to organize a transport outfit for D.L.S. Geo. Ross, out of the one I myself used in 1904. Of this I gave him eight horses, one wagon, three carts and the necessary harness. He was allowed one riding saddle and bridle and several other small articles to complete his equipment. The remainder of my outfit, with the exception of a broken cart left in storage, was delivered over to G. A. Grover, D.L.S., who took it to Winnipeg.

While at Yorkton, during the month of May, I was requested by several settlers, residing in township 26, range 8, west of the second meridian, to recommend the re-

SESSIONAL PAPER No. 25b

survey of that township, and after investigation, I reported upon the urgent necessity of making the resurvey.

Before finally leaving this place I went to see Mr. Milligan, of Fishing lake, for the purpose of securing the iron posts which had been left in storage with him several years ago, and had these posts shipped to the Manitoba Warehousing and Cartage Co. at Winnipeg.

From Yorkton, I went to Edmonton and organized an outfit for L. E. Fontaine, D.L.S., and from there I proceeded to Regina and Indian Head for the purpose of making some arrangement for the settlement of the difficulty raised about the survey of township 19A, ranges 11 and 12, west of the second meridian. At Indian Head I had a talk upon this matter with Mr. Wilson, a councillor of that municipality, to whom I explained the position of affairs, and having satisfied himself that the survey I made in 1902 was right he promised to bring this matter before the council and have it settled in a satisfactory manner to all concerned.

At Regina I discussed this question with the Hon. Mr. Bulyea, Commissioner of Public Works of the Northwest Territory, and Deputy Commissioner Mr. F. J. Robinson, who both, after explanation, completely understood the difficulty, and promised to interest themselves in its adjustment. For further details about this matter I would refer you to my letter dated the 2nd June last. Later on I again met Mr. Robinson, who informed me that the local government had authorized some change in the location of the road affected by my survey of the correction line bounding those townships on the north, and also stated that he expected the difficulty would be finally adjusted as soon as the administration for the new province of Saskatchewan would take office.

Returning to Edmonton in June, I organized an outfit for W. G. McFarlane, D.L.S., by securing two teams of horses from D.L.S. Saunders and one team out of D.L.S. Reilly's outfit. The balance of Mr. McFarlane's equipment, with the exception of a buckboard which I purchased for his use, was procured from different outfits I had in hand. The remainder of those left in storage were sold as instructed, and reports of sales made in every case.

On July 11, I left Edmonton for D.L.S. Beatty's camp at Battleford for the purpose of making the valuation of the equipage which he had supplied for his work, and from there I proceeded to Saltcoats to investigate into a dispute raised by farmers about monuments placed by D.L.S. Knight on the south and west boundaries of section 32, of township 24, range 31, west of the principal meridian. In this case, as already reported, I advised the complainants to accept Mr. Knight's survey, as it was the only legal survey by which they could govern themselves.

From Saltcoats I went to Roblin, and made some verifications in D.L.S. Knight's survey by taking barometric measurements of heights in the valley of Shell river, for details of which inspection I would refer you to my report dated August 14 last.

My next operation consisted in the resurvey of the east boundary of section 4 of township 19, range 24, west of the second meridian, for the purpose of remarking the quarter-section corner. In this case I had to establish a new mark, the old one being entirely obliterated, or so far out of its true position that I could not locate it. The work done here was most urgently required, and I hope it has put an end to a dispute which was threatening ruin to two neighbours who had lived on friendly terms for many years, but had lately taken legal proceedings against one another about this land mark. In this dispute, as well as in the other difficulties already referred to, I am happy to state that the contending parties appeared satisfied with the explanation I gave them, and were always pleased to accept my advice for the settlement of their dissensions. This tends to prove the importance of always having some one ready to investigate into quarrels raised about surveys which often are not understood by those who stir up the discord.

Returning to Edmonton on September 26, I received your instructions for the survey of town lots at 'Rivière-Qui-Barre.' This work kept me busy for three days in the field, but owing to a misunderstanding, a government officer, agent for the sale of

6-7 EDWARD VII., A. 1907

school lands, included part of land I surveyed in his sale, and by his action rendered my survey useless, as stated in my letter on the subject dated October 21, 1905.

In October I went to Athabaska Landing, under instructions from the Hon. Mr. Oliver, to investigate into the necessity of surveying town lots at that place, and after inquiry I found there was no immediate need for such a survey, but I met there a few residents of the place, who expressed their desire to buy parts of river lots already surveyed by Mr. McLean, D.L.S., and on my return I verbally informed Mr. Oliver of their application, and as the land can easily be described by metes and bounds he expressed the opinion that their desire could be met with, provided there would be only one claimant on each lot, and in case there were more than one, the applicant would have to buy the rights of the others before his application could be taken into consideration. These applicants were informed by me of the minister's decision, and were told to govern themselves accordingly before submitting any application for consideration.

According to your instructions, after inspection, I took over the iron posts made by the Edmonton Iron Works Company according to specification, and stored them with Messrs. Gariepy & Lessard, of Edmonton, subject to delivery to your order.

I also made arrangements to provide transport outfits for D.L.S. A. W. Ponton and R. W. Cautley, and for that purpose I authorized them to take the only horses, twenty-one in number, which were at my disposal at different places. I also gave them orders for different articles I had in storage.

Before leaving Edmonton, I made arrangements with the Edmonton Cartage Co. for the continuation of the storage of carts left by Mr. A. Saint Cyr, D.L.S., in their care a couple of years ago. In this connection I beg to call your attention to the necessity of utilizing them next summer or removing them to a better place if possible. They are now under a shed without floor and somewhat exposed to moisture, and as they rest on bare ground they are to a certain extent exposed to decay by a long sojourn in that place. It also seems to me that it would be more satisfactory to concentrate outfits at the most important points, such as Winnipeg, Moosejaw, Calgary, Edmonton, &c., and in each place, or in the country in the immediate vicinity, arrangements should be made with farmers or any reliable parties to secure proper accommodation for those used by the surveyors working in these different districts. Too often surveyors leave their outfit where they discontinue their work without securing good storage or making proper arrangements with reliable parties for the wintering of their horses. The consequence is that their horses are starved to death, though charges for keeping the same are high, and their goods are damaged through exposure and want of proper shelter, and sometimes they are lost forever. This is what happened in the case of a surveyor who some ten years ago left an outfit with a farmer near Kaposvar. He never claimed the outfit, and at the time I passed there in 1902 this farmer could not even give me the name of the surveyor, nor did he know whether he was a contractor or day man.

On December 20, on my way home, I called upon Mr. Wm. Pearce, at Calgary, and made a valuation of certain instruments, the property of the department, which he has in his possession and wishes to purchase, and I submitted to you, after my return home the percentage of deduction from the original cost which, according to me, would fairly establish the actual value of these instruments.

During the course of my travel from Winnipeg to Edmonton I noticed all over this great stretch of country an activity which can only be compared to a beehive, where all the inhabitants rivalled in working for the welfare of the community. Though I have been employed for many years in the survey of lands in the Northwest, yet, year after year I am always astonished at the strides the country is making; places which I visited a few years ago have to-day grown almost entirely out of my memory, and the industry and activity displayed is certainly very encouraging and speaks well for the future of this great country. The extension of railways throughout the Northwest is of inestimable benefit to the settlers and has opened up the facilities for marketing the products, and increased the influx of immigration.

SESSIONAL PAPER No. 25b

The rejoicing I witnessed in Edmonton on the occasion of the completion and opening of the Canadian Northern railway to that city evidenced the feeling of the population in this respect, and no doubt the building of the great transcontinental route will do much to increase the opening up and settlement of a vast extent of territory which at present labours under the want of such facilities.

The branch of the Canadian Northern railway from Edmonton to Athabaska Landing graded as far as Morinville last fall will contribute largely to the opening up of the northern district. I was greatly astonished on my arrival at Athabaska Landing to find the place so far advanced, as I supposed I was going to a place of very small importance, and was agreeably surprised to find a good hotel, several large stores and facilities for the securing of supplies for the inhabitants of the northern district.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) P. R. A. BELANGER.

APPENDIX No. 16 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF EDGAR BRAY, D.L.S.

RESURVEYS IN MANITOBA.

OAKVILLE, ONT., April 28, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour, in accordance with your instructions, to submit the following report on the resurveys of parts of townships in Manitoba, being township 20, in ranges 3, 4, 5 and 6; township 19, in ranges 3, 4 and 5; township 18, in range 2, and township 17, in range 1, all west of the principal meridian.

My instructions were received at Oakville, Ontario. I left that place on August 2, 1905, and arrived in Winnipeg on the 4th, where supplies and part of the transport outfit were purchased and the party organized. I was prepared to go to St. Laurent on the train of the 11th, but as part of my party did not appear, I was compelled to wait for the next train (which was on the 15th), and in the meantime to hire new men.

At St. Laurent we went into camp and put the wagons, &c., together. Some trouble was found in getting suitable horses at suitable prices, but a fair lot was bought and delivered on the 18th. On the 19th (Saturday) we loaded our supplies and moved camp to Clarkleigh, where I arranged for temporary storage of all surplus provisions, &c., and on the 21st we again moved camp to Lily bay. On the 22nd I commenced the survey of township 20, range 6, by chaining part of the north boundary of that township. Afterwards the survey was continued as rapidly as circumstances permitted, until the completion of the work on December 1, 1905. In accordance with your instructions, I tried to get the views of the settlers with regard to the work, and was always willing to discuss the matter with anyone interested. I soon found, however, that most of the improvements had been done according to D.L.S. Martin's survey, and the opinion seemed to be almost unanimous that Martin's survey should be confirmed, though nearly all were willing to accept Wagner's survey sooner than have no definite boundaries of their lands.

In only the following cases was I requested to adopt Wagner's survey, viz.: Northeast quarter, section 30, township 20, range 6; northeast quarter, section 12, same township; east boundary of section 16, township 20, range 5; northwest quarter, section 32, township 19, range 3, and a settler on northeast quarter, section 12, township 19, range 3. In the first of these cases the settler on section 30 claimed that

6-7 EDWARD VII., A. 1907

Wagner's line marking the east boundary of that section was about two chains west of the boundary as run by Martin. This did not seem probable, but after consideration I wrote to the settler, offering to return and establish Wagner's corner posts if he would get the necessary evidence showing where those posts formerly stood. As I received no reply, I left the matter as it now stands.

Again, in section 12 of same township, the settler on the northeast quarter-section wanted Wagner's survey because the quartering line running east and west passes through his house. It appears on examination that Wagner's line differs so little from that of Martin's, that, in either case, the house would stand on two quarter-sections. I did not make any change in this case for the reason that any change would not satisfy the owner, because he wants the line run as much as four chains south of his house.

In the case of the east boundary on section 16, township 20, range 5, I found an error of 6.84 chains in the position of the quarter post and a corresponding error in the marking on the witness post for the northeast corner of section 9. The parties interested were not at home, but as the fencing seemed to have been done according to Wagner's survey, I adopted that survey, and made post and pits 6.84 chains north of Martin's corner and moved iron witness post and trench 16 links south and changed the markings from XII. S. to V. S. The settler on section 32, township 19, range 3, claimed to a post said to have been planted by Wagner as the northeast corner of section 31. After doing some chaining to satisfy myself, I allowed his claim. Therefore the northeast quarter of section 32 is north 1.90 chains and east 2.96 chains of the same section as surveyed by Martin.

In the last case the settler on the northeast quarter of section 12, township 19, range 3, seems to believe his section post should be about eight chains north of the corner located by Martin's survey. Here a difference of two or three chains might be expected, but a difference of eight chains is absurd. At all events, as the owner was not at home, and no marks could be found to support his claim, Martin's survey was not changed.

The outlines only were resurveyed in township 19, range 3, and township 19, range 4, and little more than the outlines of township 20, range 3. Excepting in the one case mentioned, the settlers along my line wanted Martin's survey, but the result will not suit the settlers on the remaining sections unless a complete new survey is undertaken.

As the character of the country has been described in the report of the surveyor who made the original subdivision survey, I will only briefly report that the land is generally nearly level, and has a good soil, but as the soil is shallow and stony and also has a gravel subsoil the country cannot, in its present state, be classed as suitable for raising grain, though I noticed a number of cases where wheat and oats had been sown and the crops gave good returns. However, having regard to the expense involved in clearing the land of stones, &c., it would seem that these townships are naturally better suited for cattle raising and dairy farming than for any other special purpose. At all events, the raising of cattle has been almost exclusively followed by the settlers for some years, and it is only lately that raising grain has been attempted.

The country along the northern sections of townships 20, in ranges 3, 4, 5 and 6, is mostly scrub or timbered land, with hay swamps and marshes. Going south the timber gradually becomes scarcer and the country more open, so that in the southerly sections of townships 19, ranges 3, 4 and 5 we find prairies dotted with scrub or small poplars. Township 18, range 2, and township 17, range 1, are mostly scrubby with some woods of poplar. The timber is generally of little value except to the settler, and is not, in quantity, more than sufficient for the immediate needs of the occupants of the land.

Hay swamps plentifully distributed over these townships afford excellent pasturage and large quantities of hay of good quality. The supply of surface or swamp water has been generally sufficient for the needs of settlers. However, the main dependence for water is now on wells, as a good supply of water, of good quality, can almost always be found on any quarter section. Running streams are very scarce.

SESSIONAL PAPER No. 25b

Wood is the only fuel available at present. The supply is not more than will be needed by the settlers.

I finished the survey on December 1, and on the 2nd started for Oak Point, where we arrived on the 3rd. At this place I arranged for wintering the horses and storage of outfit. I paid off the party in Winnipeg on December 6, and arrived at home on the 9th.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) EDGAR BRAY, *D.L.S.*

APPENDIX No. 17 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF LENNOX T. BRAY, *D.L.S.*

SURVEYS IN MANITOBA AND EASTERN SASKATCHEWAN.

AMHERSTBURG, April 17, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report, on the surveys I made last season in various parts of Manitoba and the eastern part of Saskatchewan.

In accordance with your instructions of April 4, 1905, I left Amherstburg on April 27, and proceeded to Virden, Manitoba, where my outfit had been stored and horses wintered the fall previous.

After fitting out I started for townships 15 and 16, range 16, west of the principal meridian, arriving at Franklin on May 8, where I was held up a couple of days owing to bad weather. Here I was joined by Mr. J. Shepley, my assistant, and on May 11 I started my work of retracing in township 15, and completed this and township 16 by May 20.

May 22 I started with outfit to Strathclair and thence into townships 18, ranges 21 and 22, where the work of retracing and restoring was carried on throughout these townships. On the completion of this work I proceeded, under your instructions of July 15, to township 11, range 21, west of principal meridian, and made a traverse of those portions of Assiniboine river running through sections 10, 11 and 2 in that township.

I then started for township 10, ranges 31 and 32, west of the principal meridian, but as the roads were very heavy, owing to the rains, I was compelled to put on an extra team at Virden, and arrived in township 10, range 31, on September 19, where the work of retracing and restoring of this and township 10, range 32, was carried on.

On the receipt of your telegram dated October 1, after completing the work in these townships, I moved into Virden on October 19, and arranged for the wintering of the horses and storing of the outfit. Here I paid off most of my men and then went to Neepawa, where I hired a team, and with the remaining men did some rechecking in townships 15 and 16, range 16, west of the principal meridian. Closing up field operations on October 30, I started for home.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) LENNOX T. BRAY, *D.L.S.*

6-7 EDWARD VII., A. 1907

APPENDIX No. 18 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF R. W. CAUTLEY, D.L.S.

SURVEY OF THE SIXTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

EDMONTON, November 30, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to make the following report on my survey of the sixteenth base line between the fifth and sixth meridians. I left Edmonton with my party on November 11, 1904, and proceeded to the sixteenth base line by an excellent wagon road through St. Albert, Ray and Rivière Qui Barre. From the latter point the road is very bad in places, especially in the heavily wooded vicinity of Deadman lake, until it reaches the crossing of the Pembina river, where it ceases to be a wagon road altogether and is known thenceforward as the Swan hills trail to Lesser Slave lake. The Swan hills trail was originally run in the early days of the Klondike excitement, and, until the present year when the government has established current ferries across the Pembina and Athabaska rivers, has been very little used since, so that we had to do a good deal of road making in order to get the heavily loaded wagons through. We arrived at the sixteenth base line on November 18, 1904, near the centre of range 4, west of the fifth meridian. From November 19 to December 13 inclusive I resurveyed that part of the base line already surveyed by Mr. Fontaine to the crossing of Athabaska river, while the party were engaged in cutting a trail and moving our stores and horse feed over it. On December 14 we crossed the river and continued the line without interruption until March 3, 1905, when it became necessary for me to go into Edmonton for more men, horses and supplies, leaving the work in charge of my assistant, Mr. P. A. Carson, whom I have found to be thoroughly competent, and who has unfailingly shown himself to be ready and willing to do anything in his power to further the work. At this time, March 3, the winter, which had been a very mild one throughout, was practically over; heavy rain had fallen for ten hours on February 25, and a steady thaw had set in ever since, so that almost all the snow had disappeared and the streams and rivers were flooded with from six to eighteen inches of water running over the ice. I fully expected that it would turn cold and snow again, so as to make sleighing possible, but it remained warm and fine, and I was therefore obliged to take in all necessary supplies by pack train. Under the circumstances, I bought ten more pack horses to bring my own pack train up to what I considered an efficient state, in view of the size of my party and its distance from the base of supplies, and also having hired some Indian packers, arrived in camp again on April 3. From this time the work was uneventful until May 18, when I completed my line and found that the sixth meridian had not yet been run so far. Our return journey, as far as Athabaska river, was very slow, owing to the weakness of the horses, which were suffering from lack of feed and foot-rot caused by standing about in the wet muskegs, so much so that several of them died. At Athabaska river, however, we built a boat and a raft, and having started the horses home with the packers by the trail we had come out on, the rest of the party, with almost all the outfit, started down the river on June 7 for Athabaska Landing, a distance of about 240 miles by the river. From Athabaska Landing there is a good wagon road to Edmonton, and the whole party arrived in town on June 15, after rather more than seven months in the field. During this time I resurveyed forty miles and surveyed one hundred and twenty miles of new line, but it must be remembered that from beginning to end of the survey it was necessary to cut a trail through solid bush and windfalls to move camp and supplies over, and that one-third of the entire party's time was occupied in so doing.

The whole country through which the line ran is covered by thick bush or brulé, with an unusual amount of dead and wind-fallen timber all through it. The surface consists of an undulating plateau from two hundred to four hundred feet above Atha-

SESSIONAL PAPER No. 25b

baska river, and there are large areas of spruce and tamarack muskegs which become more numerous towards the western end of the line, until, after leaving Little Smoky river, in range 22, the whole surface of the country consists of large muskegs alternating with gravel ridges covered with moss and stunted pine. With the exception of some very good bottom land along Athabaska river, I did not see any land, after crossing the river in range 7, that is suitable either for farming or stock-grazing, and it is the poorest country for horse feed that I was ever in.

On the other hand, there is a good deal of timber that cannot fail to be valuable as soon as there is any demand for it at some down-stream point on the river, or a railway opens it up to the markets of Alberta. Spruce timber suitable for lumbering purposes occurs in valuable quantity in ranges 12, 16 and 17, and along the banks of Athabaska and Little Smoky rivers. Besides this highest grade of timber, there is a practically inexhaustible supply of smaller stuff suitable for railroad ties and fence posts. From range 15 to the sixth meridian there is a great deal of pine, which some of the best woodsmen I had with me called white pine, and declared to be almost identical with the white pine they had worked amongst in eastern lumber camps. This pine has a smooth black bark, clear white grain, grows very straight and is generally sound at the heart, but although there are numbers of trees over eighteen inches in diameter at many places in the line, as a general rule the timber is small, and there are not enough sizable trees in any one locality to make lumbering profitable. Besides the spruce and pine mentioned, there are a great many poplar, some birch and balsam firs in ranges 16, 17 and some of the ranges to the west of these. Devil's club occurs quite frequently, this being the first time I have noticed it in Alberta.

There are only a few Stoney Indians scattered throughout this district, and no white settlers, the state of the country makes it impossible to travel through, except on the river; and with the exception of the lynx, of which there are a great number, the country seems to be almost destitute of game or fur; members of the party saw two moose at different times, some beaver and a few lynx, but it is evident, from the absence of tracks in the snow, that there are very few animals except rabbits and the lynx that live on them.

There is a singular absence of lakes in this region, none of any size having been crossed on the line, but there are a number of small streams besides Christmas creek in range 10, Carson creek in range 12, Cautley river in range 12, and Little Smoky river in ranges 20, 21 and 22, all of which are fair-sized streams with well defined valleys and full of large trout, some weighing six pounds having been caught by members of the party.

Athabaska river, upstream from its intersection with the sixteenth base line in range 7, is very much cut up by bars and islands, where the water is all in one channel it has an average width of 12·00 chains, but in many cases the bed of the river from bank to bank is half a mile in width, and sometimes much more. Floating down the river at high water this spring we ran, on the raft, from a known starting point to the intersection of the sixteenth base line in range 7, a distance of sixty-five miles, allowing for bends in the channel, in exactly twelve hours, which gives a current speed of 5·4 miles per hour, but after the first day's run the current was much slower, probably not more than three and one-half miles per hour. During an ordinary stage of the water the current would be about thirty-three per cent less than the above figures.

While coming down the river in the spring we met two parties of placer miners, one of which was working at the time; these latter were wheeling gravel down to the water from the top of the bank at the edge of vegetation, from which it was evident that they were mining float gold, and indeed what I saw was very fine, but they appeared to be satisfied with the result. On Little Smoky river and along the Athabaska there are abundant evidences of coal, small seams being visible in the cut banks and heavy pieces in the beds of the streams.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) R. W. CAUTLEY, D.L.S.

6-7 EDWARD VII., A. 1907

APPENDIX No. 19 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF R. W. CAUTLEY, D.L.S.

SURVEY OF THIRTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

EDMONTON, April 30, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on my survey of the thirteenth base line, made under your instructions dated November 21 and December 7, 1905.

On December 15 I commenced to get my outfit together at Edmonton, and on January 3, 1906, the outfit left Edmonton for Mewassin, where I hired some farmers and their teams to haul horse feed, and proceeded up Saskatchewan river to its intersection with the thirteenth base line; at this point the banks of the river are very steep and rough, and the only place where it was possible to cut a road off it, was about two and one-half miles down stream from the line. From the river we cut about twelve miles of road through very heavy *brulé* and windfalls, finally arriving at the point of commencement on January 19, 1906.

From January 19 to March 17 the work progressed without interruption through nine ranges, making a total of fifty-four miles of original base line surveyed.

On March 19, I started back over the only possible road,—that which the entire party had spent more than one-third of the season's work on,—and when I reached the Saskatchewan, travelled on it all the way to Edmonton, where I arrived on March 28, and paid off my party.

In ranges 9, 10, 11 and the easterly half of 12 the soil is generally good and surface evenly rolling, although very much encumbered with dead and wind-fallen timber, but beyond this the country through which this line passes is composed of sandy pine ridges alternating with muskeg, and is very poor. After leaving the tributary of Pembina river which the line crosses in section 32, range 11, the elevation gradually but steadily increases until the end of the line surveyed, which is within forty miles of the summit of the nearest range of mountains toward the southwest, and probably within fifteen miles of regular foothills. As the mountains seem to lie almost due northwest and southeast, it follows that the end of the line is still a long way from mountainous country towards the west, and can probably be extended another twenty-four miles before even entering the foothills.

The whole country through which the line passes is covered with timber, mostly *brulé*, and in many cases wind-fallen for miles to such an extent that, except in the case of a large and thoroughly equipped party, such as I had, to cut road, it is impracticable to travel through it at all. Most of this timber is second growth, and although there has been very heavy spruce, jackpine and poplar timber in many places at some former time, a fire, or more probably a succession of fires, has so devastated the greater part of this territory that there is no milling timber at the present time, and very little that is of value for secondary purposes such as railway ties or fence posts.

Although most of the country traversed is very close to the height of land between the Saskatchewan and Athabaska rivers, it is quite sufficiently watered by a number of small spring creeks. Pembina river which occurs in range 9, and a large tributary of the Pembina which crosses the line in range 11, are the only streams of importance, and there are no lakes of any size.

There are no settlers or Indians in the vicinity of the line, and the absence of tracks in the snow indicates that there is very little game such as moose or cariboo, while on the other hand there are many lynx, and some fox, beaver and otter. The winter in this part of the province has been even more mild than last winter was, and I cannot conceive of a more beautiful winter climate anywhere,—clear, bright and mild. Farmers all over the country find themselves with full hay stacks, put up for

SESSIONAL PAPER No. 25b

stock feeding during the past winter, but which were never used because stock continued to do well outside all winter, and in fact the only people in this part of Alberta who were dissatisfied with the weather were those who depend on the winter snow for transportation purposes, particularly lumbermen who have hardly been able to get out any logs for the two past seasons.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) R. W. CAUTLEY.

APPENDIX No. 20 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF W. A. DUCKER, D.L.S.

SURVEYS IN SOUTHERN MANITOBA.

WINNIPEG, May 2, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—In accordance with instructions dated December 19, 1904, I surveyed portions of townships 6, 7 and 8, range 11; 6, 7 and 8, range 12; part of township 8, range 10, and part of township 7, range 14, all east of the principal meridian.

These townships were most easily reached by the Dawson road from Ste. Anne.

Over seventy-five per cent of the total area is swamp, which Mr. Jukes and myself, as commissioners, have awarded to the province of Manitoba. With the exception of a little fairly good land along part of Whitemouth river, the district is not suited for settlement.

Most of the soil on the dry portions is very light sand which, if cultivated, would drift badly and does not appear to possess the necessary strength for raising any kind of crop. The soil of the swamps is chiefly a kind of peat overlaid by several inches of moss and is too wet for cultivation unless cleared and drained. The peat beds seen do not appear to have the necessary depth to render them valuable for fuel purposes, though they were not tested except in a very few instances. In some places the peat contains a large percentage of silica.

The large timber has been nearly all removed for lumber or fire-killed, and only a very small proportion of that left is over eight inches in diameter. The ridges are partially open and the balance timbered with jackpine and a little poplar. The greater portion of the swamps is timbered with spruce and tamarack in which the black spruce strongly predominates, though there are considerable areas of tamarack suitable for fuel purposes which would become valuable should a railway be built through the district.

A more detailed account of each township will be found in the end of the field books.

(Note.—These descriptions are published as part of appendix No. 44.)

Yours respectfully,

(Sgd.) W. A. DUCKER, D.L.S.

6-7 EDWARD VII., A. 1907

APPENDIX No. 21 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF A. DRISCOLL, D.L.S.

SURVEY OF THE SEVENTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

EDMONTON, ALTA., November 1, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—In connection with the survey of the seventeenth base line from the fifth meridian west to range 19, which work you entrusted to me during the past winter, I have the honour to submit the following report:—

My party was made up, and left Edmonton on the 9th day of December last, followed by myself a short time afterwards. We followed the Edmonton-Athabaska Landing trail to a point opposite the seventeenth base. At this point I paid off the teams transporting the bulk of my supplies, and introduced my pack animals to flat sleighs, and judging from their actions it was apparently their first experience, but after a few days they became accustomed to the work and were drawing from four to five hundred pounds each. By the end of December we had reached the intersection of the seventeenth base and the fifth meridian with all our supplies, and commenced the survey in view.

Having cleared out the fifth meridian for some distance, an approximate angle was turned off from the iron post which was found in good condition at the northeast angle of township 64, range 1. The line from there west was carried through a district but little seen except by Indians and trappers, and traversed for the greater part a rolling country with numerous muskegs, except along the Pembina and Athabaska rivers where tracts of fair land were to be seen, which were formerly covered with a heavy growth of spruce but are now in a wilderness of *brulé*.

The character of the country remained unchanged until the Edmonton-Peace river trail, in township 64, range 5, was reached. At this point, however, the ground rises, and having been swept by fires for a number of years past, the soil has been cleared and shows a good growth of grasses, which was a very welcome change to my ponies which had been subsisting mainly on muskeg grass for some time.

I had expected to meet teams on this trail with supplies for the continuation of the survey westwards, but learned from an Indian who had just come through that the teams were stalled at Athabaska river on account of the trail between being filled in with fallen timber, and could not proceed without further assistance. I therefore set my men to clear it out, leaving my assistant with a small party to continue the line, and took advantage of the delay to go to Edmonton to arrange for the balance of the supplies needed.

I might mention here that this trail referred to was constructed by the Northwest government during the Klondike rush and for that occasion, and it was neglected after the following year in favour of the Skagway route and for humanity's sake. During the past summer, however, the local government have replaced the ferries across Athabaska and Pembina rivers, and the Dominion Government has undertaken the reconstruction of this road through to Slave lake, where connection is had with a road being made by the Northwest Mounted Police through to Dawson for the purpose of an all Canadian route and policing the north country.

Having cleared the trail as far as my camp sufficiently to get in my supplies, the survey was proceeded with and continued as far west as section 33, township 64, range 19, west of the fifth meridian, where we crossed Sturgeon lake trail, and which was reached on April 5 last. By this time I was in somewhat of a predicament, having only some ninety pounds of flour and a less amount of bacon, and being some two hundred and twenty-five miles from Edmonton it was questionable if we would have sufficient to carry us out; it was necessary at all events to discontinue work, so the following morning we started for Edmonton.

SESSIONAL PAPER No. 25b

The country from the Peace river trail to where I quit work may be described as in the same condition as when Mr. Horetzky reported it as being worthless for agricultural purposes, consisting of rolling sand hills clothed with small jackpine, and muskegs with scrub spruce and tamarack. The valley of Freeman's river, which we followed for some distance in ranges 10 and 11, contains spruce in small quantities up to thirty inches in diameter, but not sufficient for commercial purposes. Where we finished work in range 19, the country seemed about to change for the better. We were then on the slope of Smoky river, a tributary of the Peace, and open spaces of prairie were to be seen. Another good indication of improvement is the presence of several trial line surveyed by the Grand Trunk Pacific railway in anticipation of putting a line through here. Thanks to their efforts, the trail to Edmonton was in fair shape for pack horses.

I might close my report with a few remarks on the transportation question as applied to this work during the winter season. I fortunately did not attempt to cut a trail for teams, as I found out afterwards that that would have been practically impossible. I provided myself with flat sleighs one-half inch thick and ten feet long and twenty inches wide, and depended on them to see me through, also taking along pack saddles to be used on the disappearance of snow and for returning to Edmonton. A stout pony has no difficulty in drawing from four hundred to five hundred pounds on one of these sleighs through almost any kind of country provided a reasonable trail is cut. They can cross a fair amount of fallen timber, and swing around stumps and trees in a surprising manner. After the first horse has broken the trail it becomes much easier for the rest, and the following morning it becomes a regular ice shoot, when it is an easy matter to get up the heavier articles. By the use of these sleighs the horses are much easier kept than by using pack saddles.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) A. DRISCOLL, *D.L.S.*

APPENDIX No. 22 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF C. C. FAIRCHILD, *D.L.S.*

SURVEYS IN WESTERN ALBERTA.

BRANTFORD, April 16, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR.—Acting under instructions dated May 31, 1905, I proceeded from Brantford on June 9 to Calgary, where I procured an outfit, and thence on to Kananaskis, where my work began.

I made the resurveys and the new surveys in townships 24, ranges 8 and 9, west of the fifth meridian, including traverses of Bow and Kananaskis rivers and a small lake in township 24, range 8, and then proceeded with the surveys required in township 24, range 10; townships 25, ranges 10 and 11, and township 26, range 11.

I also made a number of surveys for Mr. Douglas, superintendent, of villa lots in Banff, where the old stakes were lost, and a survey of Grand View Villa hotel for the department.

One of my chief difficulties was the keeping of my horses owing to the fact that little of the Canadian Pacific railway is fenced and the river valley being narrow with scant vegetation suitable for feed.

6-7 EDWARD VII., A. 1907

On December 9, we proceeded to Morley to make a connection as instructed, on the west boundary of the Morleyville settlement.

The outfit was sent down on a sleigh and pack horses, but a chinook wind swept off all the snow before we arrived, and I was forced to ship everything except the horses by rail.

As I did not complete the survey of all the townships in the vicinity of Banff, I sent the camp outfit and rigs to Brewster Brothers, of Banff, for storage, and the horses were left to be wintered with J. W. Wood, at Dogpound.

Many of the lines run reached the top of the mountains along Bow river, and some I found it impossible to survey.

All of the work lay within the bounds of the Rocky Mountains Park, and all as well between the foothills and summit of the Rocky mountains.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) C. C. FAIRCHILD.

APPENDIX No. 23 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF LOUIS E. FONTAINE, D.L.S.

FOR SURVEYS IN NORTHERN ALBERTA.

LÉVIS, QUE., March 21, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on the surveys executed by me in northern Alberta during the last season, all of which were made in conformity with your instructions dated April 6 last.

On April 24, I left Lévis for Edmonton, Alberta, where I made a short stay for the purpose of engaging men, ordering supplies and necessary repairs made to the transport outfit. These preliminaries being attended to and my organization completed, owing to the prevalent rains I was obliged to postpone my departure until the 13th day of May. On the last named date, conditions being favourable, I left Edmonton by way of Sprucegrove, Stonyplain and Mewassin, and from there proceeded to the southeast quarter of section 6, township 52, range 3, west of the fifth meridian, where I was to begin the traverse operations in the said township and range.

At the starting point on account of the thick smoke emanating from smouldering embers remaining from the conflagration which had lately been raging in this vicinity, a few days elapsed before operations could be carried on effectively, but eventually we had three days' heavy rain which cleared the atmosphere, and hereafter the work proceeded successfully and uninterruptedly.

My next move was to proceed to township 52, range 2, west of the fifth meridian, where I was called upon to perform the traverse of a certain number of lakes leftover when the subdivision of the township was made. In order to achieve this purpose, I first made an exploration so as to get a preliminary location of said lakes. This being accomplished, I came to the conclusion that owing to the number and the extent of some of them, this work could not be proceeded with unless I could procure boats. Notwithstanding my inquiries none could be had in the vicinity, and I had almost decided to postpone the operations till fall when I found that lumber could be procured from one of the settlers; thereupon I immediately purchased the necessary material,

SESSIONAL PAPER No. 25b

and set my party at work building two boats (punts), and by the use of them I successfully carried on the survey.

The next operation was the retracement of township 53, range 3, together with the traverse of a few lakes in said township.

In this township, excepting the traverse of Muskeg lake, where piles had to be driven into the ground at all instrument stations, no other difficulties had to be contended with during the operations.

Your subsequent instructions called for the restoration survey of township 50, range 4, west of the fifth meridian.

In proceeding with this work, I must say that all section lines previously run on the north side of Saskatchewan river could only be followed in the islets of green timber spared by the lumbering operations and fire. Posts and monuments were not to be identified. I therefore opened the outlines of the township excepting the south boundary, as directed. This being accomplished, I made a totally new subdivision of the township, obtaining at the same time from the few settlers therein their consent, in writing, to the re-establishment of the new boundary corners.

(Note.—Descriptions of the townships surveyed have been taken from this report and published as appendix No. 44.)

On the conclusion of this last operation, the season being well advanced, I decided to return to Edmonton, where I discharged the party on December 11.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) LOUIS E. FONTAINE.

APPENDIX No. 24 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF GEO. A. GROVER, D.L.S.

RESURVEYS IN MANITOBA.

129 WILLIAM STREET,
KINGSTON, March 30, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR.—I have the honour to submit the following report on my past season's work on resurveys in Manitoba.

Under your instructions dated May 2, 1905, I left Kingston on the 5th, and proceeded direct to Yorkton where I met Mr. Belanger, Supervisor of Surveys. We proceeded to Theodore, where Mr. Belanger's outfit was stored, and I shipped the part allotted to me direct to Winnipeg Beach in charge of a man whom I had engaged in Yorkton.

My instructions were to outfit in Winnipeg, but owing to the state of the roads I shipped everything by freight to Winnipeg Beach, buying four additional horses at West Selkirk. Horses were scarce and high priced.

I left Winnipeg Beach on May 20, and started work in township 21, range 3, east of the principal meridian (where my first work was) on the 26th, and finished retracing and reposting the lines on July 13. This township had been carelessly surveyed and marked only with wooden posts, now mostly destroyed. The old survey was thus rather a hindrance than any assistance, and I think a resurvey would have been more satisfactory.

6-7 EDWARD VII., A. 1907

During the early part of the season I was retarded by rain, which in such a wet country was very troublesome.

On July 14, I started for my next work, in township 18, range 1, west of the principal meridian, going around by Gimli and Teulon, and reaching the work on the 19th. For the balance of the season I was engaged on resurveys in townships 18, 19 and 20, range 1; townships 19 and 20, range 2, west of the principal meridian, and township 18, range 1, east of the principal meridian; all of which had been originally subdivided over twenty years ago, and were recently resurveyed in part by A. F. Martin, D.L.S.

The settlers in these townships were reported to be in confusion owing to a double set of lines, but the only case of the kind I found was in township 19, range 2, west of the principal meridian, where there were three settlers prior to Martin's survey who claimed the new lines were in error. I found that the error was really in the old lines, but in one case, viz., about section 4, township 19, range 2, I deflected the lines so that the section is governed by the original posts. There were no settlers adversely affected by any changes I made.

Following my instructions, I then retraced and remeasured all Martin's lines in the townships allotted me, and did in addition some resurvey, finishing the resurvey of township 18, range 1, west of the principal meridian, and doing as much as time permitted in township 18, range 1, east of the principal meridian, and in township 19, range 1, west of the principal meridian. In these resurveys I did not attempt to use the original survey, as the posts were mostly lost and would have only confused the survey if found, but I joined up Martin's posts in accordance with the Manual.

I stopped work, and pulled into Teulon on December 4, stored my outfit with W. C. McKinnell of that place, took train to Winnipeg, paid off my party and reached Kingston, December 11.

The fact that the assistant, promised me in my instructions, was not furnished me, not only made the survey unnecessarily laborious for me but was not economical of time, as the nature of the work demanded that I see many of the settlers, and the camp work demanded a great deal of attention to understand what had previously been done and to avoid errors.

In conclusion, I would urge that the resurvey of these townships be made complete, and that patents be granted only subject to such resurvey. The settlers are very anxious to have the further resurvey, and it would seem to be best from a departmental standpoint, as the old survey is almost entirely obliterated.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) GEO. A. GROVER, *D.L.S.*

APPENDIX No. 25 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF ERNEST W. HUBBELL, *D.L.S.*

SURVEYS IN THE PROVINCE OF SASKATCHEWAN.

OTTAWA, January 30, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my field operations during the past season in the province of Saskatchewan.

In compliance with your letter of instructions dated May 1, 1905, I telegraphed to Edmonton, where my outfit was stored upon completion of field work last season, and

SESSIONAL PAPER No. 25b

had it conveyed by rail to Moosejaw (my organizing station), where I found it awaiting me on my arrival on May 6. With the aid of two men engaged for the purpose, we unloaded the car, put wagons and harness together, and pitched tents that day.

The following week my party arrived, and was under canvas by the 11th. In getting our outfit in shape much delay was caused by continuous rains and snow, everybody and everything around camp being covered with mud. Prior to this the weather had been ideal, but it now suddenly changed and became cold and wet. The dust was flying in the streets of Moosejaw in early April, and at that date considerable ploughing and seeding had already been done in this district. But although that kind of weather may be favourable for spring ploughing, &c., it had the effect of retarding the growth of pasture, there not being sufficient grass to keep sheep until the middle of May.

Shipping part of our supplies by rail to Chaplin (54 miles), we pulled out of Moosejaw on Monday, May 15, en route for township 22, range 7, west of the third meridian, following a good trail that almost parallels the main line of the Canadian Pacific railway as far as Chaplin and thence turning northwesterly, taking with us the supplies and iron posts previously shipped to Chaplin. We arrived at our destination, a total distance of eighty-five miles from Moosejaw, on May 18. Camp was pitched in section 14, on the edge of a large marsh or slough (shown on the township plan as a lake), and we commenced work the following day (the 19th) by running the east boundary of section 3, and finished the resurvey of the township on June 5, having surveyed fifty-two miles.

The township is open prairie, and fairly level, excepting the western portion, which is hilly and broken on account of the numerous ravines running into the south branch of Saskatchewan river, which meanders through this township from south to north, flowing northerly. With the exception of a few scattered bluffs of small poplar and some cottonwood in the ravines mentioned, there is no wood of any description. The soil is light and sandy throughout, excepting along the river, where it is nearly pure sand. All, or nearly all, the quarter-sections were homesteaded, principally by a colony of Germans, who were building a small village on the northeast quarter of section 22, and, until my arrival, could not locate their homesteads, as the survey corners throughout were obliterated, lost, or not marked in any distinguishing way. A well-beaten and good trail from Swift Current to Saskatoon runs through this township.

On June 6 we moved camp to section 30, township 22, range 6, west of the third meridian, commencing work the following day by running the north boundary of the township, and finished the resurvey, covering sixty-six miles, on June 19.

This township is open prairie, level and undulating, and is without one stick of timber or bush of any description. The soil is rated as second-class, it being of a light sandy loam. A few of the sections were entered for homestead at the time of survey, but no improvements were visible.

Whilst at work in these two adjoining townships, we dug wells for drinkable water, and hauled firewood a number of miles. Hardly any water and but few sloughs are in these townships. Nearly all the hay is obtained in this vicinity from the big slough or marsh indicated in section 14, 23 and 24, in township 22, range 7, west of the third meridian. This is an excellent ranching country, and the few ranchers located here do not care to see settlers coming in. Antelope are quite numerous; also coyotes or prairie wolves.

During the survey of these townships we found but two iron posts properly marked, these being township corners. The obsolete method of marking the boundary corner with tins placed on the iron posts was in practice at the time of the original survey of these townships some twenty years ago. These tins had all disappeared, as well as many of the iron posts, and a land-seeker in order to determine a quarter-section had to *first* find a township corner, then trace up the old line of mounds—a rather difficult undertaking for the inexperienced settler. The original survey of these townships was indifferently done, the line of mounds being crooked, out in azimuth, and the chainage most discouraging. Nearly all the original mounds were either obliterated

6-7 EDWARD VII., A. 1907

ated or lost, and it was only by careful chainage and long technical experience that a surveyor could distinguish them from similarly shaped hillocks in which the country abounds.

The result of the twenty-two working days on the lines was the resurvey of one hundred and eighteen miles, an average of 5.36 miles per day.

The nearest post office to the above work was 'Log Valley,' distant twelve to sixteen miles, and at which the mail is delivered once a week. The nearest telegraph and express office was Herbert, situated on the main line of the Canadian Pacific Railway, distant thirty-five to forty miles according to the location of our camp.

It might be well for me to place on record the fact that the country surrounding this locality for many miles requires resurveying very badly, the survey monuments being in a condition similar to those in townships resurveyed by me, and it being now impossible even for an experienced man to determine from the mounds (which are not marked) where he is. How much more difficult must it be then for the settler, who is not conversant with our various markings and systems of survey, and loses valuable time in the spring endeavouring to locate the boundaries of his claim before he can proceed safely with ploughing and seeding.

Following your instructions to resurvey township 18, range 17, west of the second meridian, we commenced on June 20 our journey there by trail, travelling a distance of one hundred and fifty miles, which was accomplished in six days, pitching our camp in section 9 of the above township on June 26. The weather and trails were not any too good, as June is the rainy month.

The following day we commenced the resurvey of the above township by running the north boundary of township 17, range 17, west of the second meridian, and completed our work on July 15 (sixty-six miles) in sixteen actual working days, averaging 4.12 miles per day.

The soil is first-class, being a rich, black loam, with sandy clay subsoil. The surface is generally level, with considerable bush, possibly one-fourth of the township being covered with small second-growth poplar and willow, located for the greater part in the northern portion of the township.

There are several creeks and numerous sloughs or pot holes. The water in these is fresh and good. Firewood is very scarce, it being obtained by the settler from the Indian reserve to the north.

This township is mostly under cultivation, and some of the crops, I was informed, yielded as high as forty bushels of wheat to the acre. The flourishing town of Balgonie is situated in section 3, and the main line of the Canadian Pacific railway runs across the township from east to west.

In this resurvey we found that the original survey had been fairly well done, but so long ago that the survey monuments urgently required renewing. At only one corner was an iron post found, and at many of the boundary corners there were two or more sets of mounds and pits. The incorrect ones were demolished after their positions had been entered in the field book. These 'double headers,' as can be readily imagined, caused considerable confusion among the settlers, but only in one case had the incorrect boundary corner been adopted. Most of the rejected mounds had been ploughed up. Several of the corners could not be renewed, as they were covered with tons of immense boulders and stones. I presume that the farmers thought that, by dumping all the loose stones from their quarter-sections at the corner boundaries, these boundaries would remain well preserved; if so, they most effectually accomplished their purpose, only, the 'exact' position of the boundary is now almost impossible to locate. However, this is of minor consequence, as there are fence posts at nearly every corner post site; which fence posts, I may add, were the bane of our life, as they interfered greatly with setting up the instrument over the corner post, while the barbed wire caused many an unexpected exclamation as a man gashed himself on the sharp wire points when digging the pits. Whilst engaged on this work we lost several days, owing to the heavy and continuous rain.

SESSIONAL PAPER No. 25b

On July 17 we moved to township 20, range 17, west of the second meridian, and pitched camp on the southwest quarter of section 10 (where the post office of Hednesford is situated, not in section 28, township 19, range 17, as shown on our maps), and commenced work by running the north boundary of township 19, range 17, completing the resurvey of said township 20 (33 miles) on the 1st day of August, in eleven days, averaging three miles per day, partly through thick bush.

The surface of this township is generally undulating and about half covered with thick, green second-growth poplar and willow of small dimension. The soil is first-class, being composed of a rich, sandy clay, most suitable for wheat and vegetables. There are numerous small ponds and sloughs and a number of hay marshes. This township is all settled, and considerable cultivation is in progress.

Similarly as in township 18, there were several sets of pits at the boundary corners, and all but the correct ones we destroyed. The original township plan shows a road allowance of one chain between the township and an Indian reserve situated to the north. Upon examination it was found that no such road allowance existed. We, therefore, planted on each meridian a temporary wooden post on the south limit of the reserve, and marked on the north side 'I.R.,' the distance to each post from the nearest monument being entered in the field notes.

This imaginary line has been a bone of contention among the farmers in this vicinity for many years, and will, in consequence of my ascertaining that there is no road allowance, necessitate a change of areas on the original township plan.

The western boundary of the township was not retraced, as it is a line between the township and the Indian reserve. In my opinion the existing monuments on the west side should be moved a chain east, but having no instructions to destroy or move them, I left them as they existed, reporting the circumstances to you. I was also at a loss to know how they should be marked in their present positions.

During the resurvey of this township rain interfered considerably with the work.

Owing to the tremendous inrush of settlers,—large numbers of them in the very early spring, and as an evidence of the efforts of the department to meet with the utmost promptitude the requests of these new settlers for retracing of survey lines in districts where no surveyor was available at the moment for such urgent work, I found that in several cases I had to travel long distances from one point to another, to find perhaps on arrival at the latter some telegraphic instructions countermanding previous ones, and telling me to proceed still further to some more urgently needed survey. While this involved larger expense for transport, as well as considerable loss of time which might have been put in on actual line work, than would have been the case if the whole season's work could have been laid out at the start, it was no doubt unavoidable, and after all, the main point was to enable the incoming settlers to get on to their land with the least possible delay. In several instances the urgency of these scattered portions of work related to cases where the settlers had already been on their land for some time, but had not been able to find their corner boundaries.

On August 2, we started by trail for Prince Albert, about 300 miles distant, to resurvey township 45, range 24, west of the 2nd meridian, arriving at our destination on the 18th, after travelling sixteen consecutive days. Our route lay along the Prince Albert branch of the Canadian Pacific railway, and we had ample opportunity to view this beautiful, extensive and comparatively new wheat-growing country. We averaged about 20 miles a day of travel. The trails as a rule were good, and the weather, with one or two exceptionally terrific thunderstorms, was all that could be desired. The country through which we passed is only in its agricultural infancy, but the magnificent fields of ripening grain were simply wonderful. The soil, though inclined to be light, is most suitable for wheat and vegetables; and everywhere new settlers are appearing on the scene daily. When one considers that this country a few years ago was assumed generally to be apparently worthless, the change is all the more marked. Railway companies entitled to select lands in this district hardly considered it worth the expense of sending inspectors to look over the lands, and settlers looking for wheat lands totally ignored the tract for many years. All this is, however, changed

6-7 EDWARD VII., A. 1907

now, and the future possibilities of this wonderful stretch of rolling prairie as a grain-producing district seem incalculable. Towns and villages are springing up with mushroom rapidity, and are quickly attaining a solid basis. This vast tract of country is well watered by rivers, creeks and lakes. The most important towns along the line of railway are Lumsden, Craik, Davidson, Saskatoon, Rosthern, Duck lake and Prince Albert. The lakes and ponds abound with geese and duck, while prairie chicken and partridge are most plentiful at certain times of the year. Jumping deer, antelope, wolves, foxes, mink, lynx and muskrat are also numerous, but are gradually receding northward before the advance of the iron horse, the plough and the harrow.

We crossed the South Saskatchewan at Batoche, about twenty miles east of Duck lake. By a singular coincidence it was exactly twenty years ago, during the time of the Northwest Rebellion of 1885, that I passed through Batoche as a member of the Midland battalion, under command of the late Colonel Williams. There was little or no change observable at this charming spot, the half-breeds, who form the majority of the settlers just there, devoting themselves more to gardening, hunting and fishing, and occasional freighting, rather than to general farming work. I had the opportunity in passing through Batoche, of shaking hands with Gabriel Dumont, one of the historical characters of the rebellion, and found him as hale and hearty as he seemed to be twenty years ago.

From Batoche we proceeded to township 45, range 24, west of the 2nd meridian, where we arrived on Friday, August 18. The trails, being through thick brush, were quite bad in places.

We commenced work the following day by running the north boundary of section 31, finishing the work on October 3, having run 54 miles, all through solid bush composed of willow, poplar, dense underbrush of hazel and cherry, and some birch. So thick was the growth that the original lines had all become overgrown, and had to be cut out again, thus entailing as much work as on the original survey. A large sheet of water, comprising several square miles, known as Jumping lake, is situated in the southwest portion of the township. The water is unfit to drink. There are only a few settlers located in the northern part of this township, the balance being unfit for agricultural purposes, and water being very scarce, the hot weather which we experienced having dried up all the creeks.

Owing to the corner boundaries of the original survey being of wood, they were almost all destroyed by fire, or had rotted and been buried in moss and leaves, not one in ten being found. The original survey had evidently been very poorly done, the azimuth of the lines being considerably out, as well as the chainage. The few posts that we did find only served to make the work of correcting the survey the more difficult. The weather was exceedingly hot during the survey, with a great deal of heavy rain, and the first frost was noticed on September 2. Large numbers of elk, jumping deer and bear were seen.

On October 4, we moved camp eighteen miles to section 29, township 45, range 22, west of the 2nd meridian, and commenced work the following day by running the north boundary of section 29. We finished this township on November 6, having run 64 miles. This being under the old system of survey, every section had to be resurveyed. The surface of the township is level and rolling, partly covered with clumps of poplar and willow, excepting the southwestern portion of the township, which is all bush. The soil throughout is black loam, with a sandy clay subsoil. It is well watered by numerous creeks, lakes, and sloughs, and there is ample hay for the needs of the settlers to be obtained around the large marshes.

This township comprises a portion of the Carrot River settlement, and was first settled in the early eighties, consequently nearly all the lands are homesteaded and are now well cultivated. The Canadian Northern railway crosses the township through section 36, and the surveyed trail from Prince Albert to Carrot river also crosses the township in a southeasterly direction. Wherever possible, this trail was connected with the re-established monuments. The majority of the survey monuments were either obliterated or lost. Not one iron post was to be found in the township. I

SESSIONAL PAPER No. 25b

subsequently heard that many of the mounds had never been built. In the days when this original survey was made, it was only requisite to build a trench around the mounds, (not pits as now required), and in course of time these mounds have gradually subsided into the trench and disappeared. At one point, the only mark I found, where there should have been an iron bar, was a small piece of the original post about six inches long. This was supposed to mark the northeast corner of the township.

We had our first snowstorm, lasting twenty-four hours, on October 9. Genuine winter set in on the 17th. By the 23rd all the lakes and sloughs were frozen over, and the weather was very cold. Before I left the township the settlers took the opportunity of expressing to me in writing their satisfaction at the action of the government in sending a surveyor to re-establish the corner boundaries of their homesteads, which for so many years they had been unable to find, and also took occasion to assure me of their great satisfaction with the way in which the resurvey work had been done for them.

A large body of water, comprising several miles in area, and known as Waterhen lake, occupies the southeastern portion of this township, and is simply a sportsman's paradise. The lake shown on the north boundary of section 24 was retraversed, as the original survey showed the lake in an inverted position.

On November 7, we commenced the resurvey of township 45, range 21, west of the 2nd meridian, and completed the work on December 13, having run 77 miles.

The surface of this township is comparatively level, low and flat in places, and about half covered with small second-growth poplar and willow suitable for fencing purposes. The soil is sandy loam, excellent for raising wheat, oats and potatoes. Innumerable lakes, ponds and sloughs are scattered over the township. Carrot river, a small stream about 100 feet wide and 2 to 6 feet deep, flows diagonally across the township in a northeasterly direction out of Waterhen lake. The water is not of the best quality for drinking. A portion of this river where it flows out of Waterhen lake we traversed. The Canadian Northern railway traverses this township from east to west. The thriving new town of Kinistino is situated on the southeast quarter of section 29, and has some fine buildings, including a bank, large hotel and fine railway station. As in the adjoining township, very few mounds were found. As previously stated, the mounds had evidently never been built. This caused considerable annoyance and more or less confusion among the settlers, who now occupy every quarter-section.

After completing the resurvey of this township, I traversed a portion of Carrot river and a small lake in sections 24 and 25, township 45, range 22, and then proceeded to Lake Lenore, 45 miles, and traversed therein an island of about 160 acres.

This work completed our field operations, and after storing my survey outfit and horses with Mr. J. Pollock, a farmer living near Prince Albert, I paid off my party and returned to Ottawa.

During my season's operations I resurveyed through partly timbered country 420 miles, in 139 actual working days, averaging a little better than 3 miles a day. I spent 41 days in travelling with my outfit between different allotments of work, comprising a total mileage of travel of 790 miles. During the season we had 46 days' rain, 12 of which were in June. Our first snowstorm was on October 9, and continued for twenty-four hours, but the lakes and marshes did not freeze over until the 23rd. October and November were ideal months for surveying, there being sufficient ice to carry one, thus averting the unpleasant but unavoidable task of wading through ice water. Strange to relate, the frost in the ground did not penetrate deep enough to interfere with fall ploughing, which was a daily occurrence until November 27, when we had a few days' cold snap, the lowest registration being 25° below zero, the Saskatchewan and Carrot rivers both being open until this date. From this out digging pits was a hard proposition, chopping the frozen earth with axes being the only adaptable and progressive method; but at best five men could only accomplish five sets of pits a day, not a very profitable undertaking.

Before closing my report, I beg permission to bring to your attention what I consider might be of interest to the profession in general, viz.:—

6-7 EDWARD VII., A. 1907

(1.) That the articles of agreement between the surveyor and his party should be printed in both languages.

(2.) That every surveyor under daily pay should enter at the end of his field book the number of iron posts used, both large and small.

(3.) That minors should not be asked to sign contracts or agreements.

(4.) That mounds should not be built at any place. My experience is such that I find pits last longer when no mounds are built, and to cattle seeking the woods for shelter and pea vine the sight of a heap of earth is most inviting.

(5.) That each member of the party be required to bring along with him and exhibit to the surveyor a doctor's certificate showing that he is in good health and physically fit for the employment. This would relieve the surveyor from considerable responsibility and anxiety, and the inconvenience of, as sometimes has happened, having to send a member of the party back home after the first few weeks of the survey from a point where it is impossible to replace him.

I cannot close this report without expressing my appreciation of the willing and capable services rendered by my assistant, Mr. J. B. McFarlane, who accomplished the work allotted to him in a most satisfactory and efficient manner.

I am, sir, your obedient servant,

(Sgd.) E. W. HUBBELL, *D.L.S.*

APPENDIX No. 26 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF A. W. JOHNSON, *D.L.S.*

SURVEYS IN THE WESTERLY PORTION OF THE RAILWAY BELT OF BRITISH COLUMBIA

KAMLOOPS, B.C., May , 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—In accordance with your instructions dated March 27, 1905, I left Kamloops with the survey paraphernalia by wagon on April 4, driving through Rockford, Nicola Lake and Coutlee, after sending word to some of my last year's men to meet me at Clecsby's, in Lower Nicola.

We camped at Richardson's, on Spius creek, on the night of the 6th, after one or two minor accidents, such as being badly bogged on the way. This is in township 13, range 23, west of the sixth meridian, and my instructions were to carry on the southern limit of the railway belt towards the international boundary.

Though the weather was hot in Kamloops, there was still a little snow left on Spius creek, and we had snowstorms during the early part of April. There are no roads in the vicinity, and I picked up a few pack horses as we drove through the Nicola, others being sent up afterwards, until we had a pack train of nine or ten, two of which were, however, used almost exclusively for saddle work.

With such a small number it was necessary to cut down the camping conveniences to an absurdly small amount, and when things were properly adjusted we found ourselves travelling without tents and without stoves. Instead of the former we used one large fly made out of the roof of the cook tent, and all baking was done in gold pans, which make excellent bread, but require a great deal of wood, and at high altitudes where there is no timber beyond scrubby balsam and spruce, this is a distinct drawback. In a trip of this sort, when for months you see nobody but your own party and when you are many miles from the nearest trail or wagon road, success depends to a large extent on your packer. Not only must he be an expert with the diamond hitch,

SESSIONAL PAPER No. 25b

but he must have a very well developed bump of location and that sixth sense which enables a mountain man to find a way that is possible for horses, through what appears to be an utterly impenetrable range of hills.

I was very fortunate in mine. A party of eight or nine is really too small to cope with this class of work even in the district passed through this summer, which is on the eastern slope of the mountains and consequently a great deal drier than the real coast country. But 'dry' is only a figure of speech used comparatively. I have not yet seen any long spells of good weather high up in the mountains, either east or west of the watershed, but I may have been unfortunate.

The line ran up Spius creek for a few miles, which is like most mountain streams here. That is to say, you can generally get down to it by hard climbing. Sometimes the sides are perpendicular and you cannot. It is timbered with bullpine and fir in sufficient quantities to warrant a portable mill if the new railway in the Nicola valley creates any local demand for lumber.

The creek would be almost impossible to drive on account of falls. We had some difficulty in getting the horses across when we moved camp as the water was at a high stage, but by putting on very heavy packs, which tend to hold a horse down on his feet, we did eventually get everything over.

A great many coal mines have been staked here, under provincial regulations, the imaginary limit being placed as usual too near the Canadian Pacific Railway, and great things are expected of the coal. Beyond boring in several cases nothing has come of it yet.

When moving camp, I used to send two or three or more men to help the packers and go on line with what were left. It is the only way to get anything done when you move on an average of twice a week, for although you may have only one axeman and a chainman, you may make half a mile. It is just here that a good packer comes in, one who will be found at night where you told him to go, a rare accomplishment in heavily timbered mountains, and it was not until after one or two disasters that I found the right man.

In one place we were man-packing over a ridge with a flying camp. One of the party wandered out of camp on Sunday morning, and did not come back. He very soon got lost, but fortunately met one of the packers looking for a stray horse, and went back to their camp. The next day they all tried to find me and signally failed, being scattered from the Coldwater to Spius creek. At any rate we had to hunt them up next day, which is not part of the duty attached to a flying camp on line.

On April 30, Mr. Mackie joined me from Ottawa, as assistant.

At first I ran a traverse to check the section lines of the belt limit, but in rough heavily timbered country, this is altogether too laborious an operation, and I did not continue further than the valley known as the Indian Meadows, in township 12. It is a much better plan to leave signals at known places which may be read for miles, and a check thus calculated. This does not apply when the limit runs for a long distance on one azimuth. This valley marks the southern limit of the open, park-like, bullpine country which is such a feature of the Kamloops, Nicola and Okanagan districts, *i.e.*, of the dry belt proper.

To the south you get into a wetter climate with thick balsam and some pine up to an altitude of five thousand feet. In the southerly part of township 11 and the northerly part of 10, the line was so high that we had to contend with three or four feet of old snow. This was altogether too much for the horses and we had to resort to the time-honoured but detested man-pack, for a couple of weeks.

In my experience, and it has not been slight in this respect, this is the final test of a good man on survey. Especially so on snow that will carry you for a few yards and then give way suddenly. Men who will cheerfully stand any amount of chopping or climbing will go all to pieces in the matter of temper with sixty pounds of sugar or blankets on their backs, and it saves a lot of trouble if the surveyor in charge is either a long way ahead or a long way behind.

6-7 EDWARD VII., A. 1907

While on this hill eighteen inches of snow fell. The weather moderated before we got down to where the line crosses the Coldwater, though the snow had made the river almost impassable for horses, and many of us had more or less of a ducking before everything was brought over. Two of the party had left a week or two before theoretically on account of sickness, but mainly, I fancy, because the snow ahead looked uninviting. It has always been a matter for wonder to me how the idea has become so well established that a survey is a pleasant summer picnic under canvas. Time and again I have warned men that a particular trip would be tough. The answer is always the same, that if you can stand it they guess they can. It does not always follow, as in this instance, when, after being upset in the Coldwater, and soaked to the skin during a couple of days climbing in wet huckleberry bushes, the two men I had got, left, with the most uncomplimentary opinion of Dominion surveys that I have ever heard.

The Coldwater is perhaps a hundred feet wide here, and not as rapid as many British Columbia streams, and I think could be driven without much difficulty at high water. There is a good deal of timber in townships 10 and 9, especially near July creek, which will be valuable when a railway comes in. This is a probability in the near future, as the only low pass from the Princeton part of the country is down a creek which comes into the Coldwater from the Otter valley, about on a level with the centre of township 10. It is proposed to build up the Coldwater into the Coquihalla canyon, and so to Hope. By all accounts this is the most feasible route through the mountains. Between the point at which the line crosses the Coldwater and the source of the Coquihalla there are narrow strips of bench land that might be cultivated if a railway is built up the valley, but beyond this there is in my opinion no arable land. The Coldwater is very much staked for coal, though mainly in provincial territory.

At the headwaters of Spius creek is a lake nearly two miles long, which I have named Murray lake, as a man of that name tried to make a home on its shores. There is a large open meadow which looks as though it would grow a great deal of hay, but I believe the snow stays so late in the spring that as a matter of fact nothing grows well. At any rate it has been abandoned, and the cabin is used only by an occasional Indian hunter or trapper.

The line runs parallel with a range of mountains of six or seven thousand feet, with many rocks and precipices, but at a distance of some three or four miles, so that it is really in the foothills of these mountains and does not rise to a greater altitude than five thousand, until it gets down to township 5. The hills are not precipitous, but consist of long steep slopes, for the most part covered with scrubby balsam and dense huckleberry undergrowth, though in places there are miles of dead standing trees. A heavy wind would make this country very difficult for a pack train. Both the blue and ruffed grouse are numerous, and there are some foolhens. Deer are more plentiful than in any place I know of in the interior, and were it not for the law-abiding qualities so well known in a government survey we should have had plenty of fresh meat. We were sorely tempted. There are also bears, both black and grizzly, though we did not get better evidence of the latter than through footprints as large as a ham.

Running south from the Coldwater we came into a country with no trails of any description, and the pack train was dragged through with the line. Fortunately there was at first a large area of dead standing timber with comparatively good footing and not very much undergrowth. We again got into snow, but the summer was so far advanced that we could avoid the deepest. The hills get higher and steeper, and the timber scrubbier, where there is any, as along the streams, but from the Coldwater to the south fork of the Tulameen, the tops of the hills are nearly all burnt.

Working down into townships 8 and 7, we reached the mineral country. In places where one would think no white man had ever been we came across location stakes. Twenty years ago there was quite a boom at Granite creek, and it was this excitement that produced the Sinilkameen trail, the only good pack trail connecting the interior

SESSIONAL PAPER No. 25b

with the coast south of the Fraser. Every summer there are parties of prospectors out in this district, though personally I saw only one man in four months, and he was on a rock slide a mile away. Most of this mineral is copper in various forms, exploited for the most part round Princeton and Granite creek, but found in the railway belt too. The only active work being done in the belt is at 'Summit City.' This is a galena proposition, and is considered rich, but it will take more than my power of demonstration to persuade the owners that they are not on provincial land. They had walked in so often from Hope that they were absolutely certain that my work was wrong, 'and it's impossible to use a theodolite in these mountains anyhow because of the slope.' After that, of course, it was useless to argue.

'Summit City,' however, is not as large a place as its name might suggest. In the height of summer its population may be on occasion six men; in winter there is no population whatever, and only a cabin or two and an all-enveloping snowdrift mark the spot. Transport is of course what all these places want. Ore that has to be packed on horses forty miles before shipping must be extraordinarily rich to pay. Wagon roads in the mountains cost almost as much as railways anywhere else, and railway companies regard British Columbia as a huge barrier before their trade with the east, one which must be overcome as cheaply as possible with as few diversions as may be on the way.

It is not easy to form any definite idea as to the real value of a mineralized country. There is plenty of mineral here on the surface; whether the mineral will be in paying quantities under the surface requires proof, that is to say, capital, and capital appears rather shy of this district. You cannot learn much from ordinary prospectors, because most of them were swinging an axe only a year or two ago, and cannot go much further in their description than the repetition of a few catch names like peacock copper, copper pyrites and quartz ore. When you do meet a mining expert you cannot help thinking of the western description of him in which he figures so prominently in the superlative degree. All mining centres believe that they have a bonanza. One or two out of a thousand have; the others have not; so it is quite possible 'Summit City' is a big thing.

We get nearer the high mountains all the time as we work south, and after leaving the south fork of the Tulameen the timber is green again and a good deal heavier. On this river we were troubled a great deal by thunder storms. A perfect morning without a cloud, and before night heavy thunder and deluges of rain. Speaking of British Columbia, there is nothing that a surveyor fears so much as rain. If he were in a cleared country rain would make little difference one way or the other as long as he could see through the transit. But in these mountains, with their dense undergrowth, a shower of rain means being as wet in ten minutes as if he had been swimming. Note books, watches, and everything else he carries get the same treatment. It is no uncommon thing to see men hanging cheap watches in the sun to dry out after dipping their works in the coal oil can. Some of them bake them in the stove instead of waiting indefinitely for the sun, which is very much surer. And if you are high up the rain is intensely cold, and is by long odds the greatest hardship here. Nor is it possible to lie off for all wet days. If you did there would be weeks at a stretch when no work would be done at all.

We crossed the watershed near the south boundary of township 4, range 23, when we found the old canyon trail. This is from all accounts an easier pack trail than the Similkameen, but is out of repair and very rarely used. This point is on a clearly defined line between upper country and coast climates. On the east are balsam and brulé, high steep hills up to five or six thousand feet, gradually getting lower towards the Similkameen; on the west, eight thousand foot mountains with huge precipices, cedar, fir and vine maple in the valleys. More important to us, on the east is feed for the horses anywhere; on the west only in widely scattered swamps or along the shores of small lakes. When we got as far as horse feed lasted, which was on a small pond between Mount Hopeless and Sumas, I moved down to Hope, leaving the tie for next season.

6-7 EDWARD VII., A. 1907

April, May and June were wetter than I have ever seen them in this part of the country, but we had fine weather in July, except for the thunder storms already mentioned.

As an agricultural country the district we traversed may be described as a failure, a very distinct failure. There is not enough timber to warrant its being taken out yet. When the mines are working much of it will be used by them, and will be handled by portable mills. On the other hand the climate is bracing and not too wet; the scenery is gorgeous, peak after peak as far as you can see on the west and rounded hills for sixty miles to the east. If this was a Canadian Pacific railway guidebook this district would be called a sportsman's paradise. Never having been in a sportsman's paradise I cannot tell, but deer are numerous, black bear are not uncommon, and grizzly bear can be found also. I have no doubt there are goats in the high rocks, but we were not near enough to come across them. There are plenty of grouse. But it is on minerals that the future depends.

On August 15 we canoed down the Fraser to Sumas mountain, in township 19, east of the coast meridian, where I ran some new lines and retraced some old ones. There is good land over a large part of this mountain, and it is not hard to clear, but the heavy grades on the wagon roads make it rather unattractive to settlers.

We moved down to Stave river on September 12, ran and retraced a few lines and traversed parts of both banks of the river and islands in it. The weather, which had been bad at Sumas, settled down to almost incessant rain, day and night, with hardly any intermission, and this continued while we were at Bedwell Bay, in fractional township west of township 39, west of the coast meridian. The work here was of the same character as at the last two places. Some traversing, a few lines, retracing some old ones and tying on to group lots whose corners were lost. It rained practically all the time, and at last I wired to the Surveyor General for permission to move up to the dry belt. This being accorded, we began work in township 15 range 27, west of the coast meridian, on October 13.

Besides straightening up some old group lots on the west side of the Fraser I ran a traverse of the Fraser, with a skeleton of section lines to the railway belt limit at the north boundary of township 18, range 28, west of the sixth meridian. There are benches on the east side of the river which with water could be cultivated, but I believe settlers already on the ground find it difficult to get as much as they need. On the west side of the Fraser the mountains rise very abruptly, and what benches are on that side have been taken as Indian reserves or by Indians living off the reserves. There is some pine timber, but not any large amount, and one hydraulic concern besides a dredge which while we were in the neighbourhood was not working, though I believe it has since done so.

After retracing the boundaries of lot 13, group 1, in township 15, range 25, west of the coast meridian, and doing more work on lots 1 and 2, group 1, and lot 359, I paid off all hands and went up to Kamloops for the winter on December 13.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) ALFRED W. JOHNSON.

SESSIONAL PAPER No. 25b

APPENDIX No. 27 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF G. J. LONERGAN, D.L.S.

SURVEYS IN THE EDMONTON DISTRICT.

BUCKINGHAM, QUE., March 15, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I beg to submit the following report of the survey in the Edmonton district for 1905.

I left Ottawa, on April 23, and on my arrival at Edmonton I engaged a car, and loading the outfit together with two months' supply of provisions, started for Ponoka on May 2. I left Ponoka for township 46, range 2, west of the fifth meridian. From Ponoka to Pigeon creek is a well settled district and has good roads which are in many places graded, but from the creek west it is a very poor trail that follows the north bank of Battle river and it ends at Battle lake.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 44.)

On October 1, I received your instructions to lay out the new townsite of Fort Saskatchewan. This I did and laid out about one thousand three hundred (1,300) lots, fifty feet by one hundred and fifty feet (50' x 150'), leaving streets eighty feet (80') and lanes twenty feet (20') in width. I completed the work on December 5, and was preparing to return east when I received your message that it was necessary to make a traverse of the Fort Saskatchewan settlement lots and Saskatchewan river. I completed this on the 16th and then left the outfit at St. Albert, paid off the men, and on the 18th (Sunday evening) I took the train for the east and arrived in Ottawa on December 24.

I wish to mention specially the able assistance that has been rendered to me during this season to my assistant, Mr. T. A. Davies.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) G. J. LONERGAN.

APPENDIX No. 28 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF C. F. MILES, D.L.S.

SURVEYS IN SOUTHERN ALBERTA.

OTTAWA, May 14, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to report on my last year's operations in southern Alberta as follows:—

I received instructions on April 18, and left Toronto for Calgary the 22nd of the same month. Arriving at Calgary, I hired a man on the 27th to drive to Midnapore to examine the outfit. On the 28th, I engaged three men to take the outfit to Macleod, where they arrived on May 3. Here I was having repairs made to the transport and buying supplies until the 6th, then left for my initial work, arriving at Waterton river on the southeast quarter of section 36, township 5, range 27, west of the fourth meridian, on May 7. I started the traverse of Waterton river on May 8, commencing on

6-7 EDWARD VII., A. 1907

the east boundary of the northeast quarter of section 36, through thick willows. We were delayed several days by snowstorms, which by the way may be mentioned are a great boon to the country, the thawing of the snow, unlike rain, soaking into the ground. Completed traverse of Waterton river, in township 5, range 27, west of the fourth meridian, on May 17; on the following day moved camp to quarter-section pits on east boundary section 33, township 3, range 28, west of the fourth meridian, continued traverse of Waterton river in this township, and completed same on the 22nd. Moved camp again on the following day to section 35, township 2, range 28, west of the fourth meridian, on Belly river, traversed that river across the township, including West island, finishing same on the 31st, took observation on same evening on north boundary of section 21, township 2, range 28. All this country traversed by me has hitherto proved a good ranching country, and is well adapted for dairying and for raising cereals.

On June 1, I started with my outfit for Macleod, thence to township 9, range 27, west of the fourth meridian, which township I resurveyed. This township hitherto has been used for ranching purposes, but now settlers have taken possession of part of the northern half, and are appearing to do well. The southern half appears to me to be adapted only for ranching purposes. While my men were remounting this township, I struck off on June 24 with a small outfit for township 17, range 2, west of the fifth meridian, to make a traverse in section 4 of Stimson creek. Owing to heavy rains I met with some delays on my way. I however managed to complete the traverse by June 29, but owing to cloudy skies secured no observations on Polaris. I returned with my outfit to township 9, range 27, on July 1, and on the 3rd we commenced our move to township 7, range 4, west of the fifth meridian, passing through the villages of Pincher Creek, Cowley, Frank and Blairmore, we reached township 7, range 4, west of the fifth meridian, on July 6. This township is extremely hilly, and in my judgment is adapted only for lumbering and coal mining. Some fine standing timber was met with here, which unfortunately was fire-killed the year before. Coal was said to be in abundance. Several seams were observed, but none were being worked at the time. I left township 7, range 4, west of the fifth meridian on the 15th day of July, and started on my return south to township 3, range 29, west of the fourth meridian, passing, after leaving Crow's Nest pass, through some fine country, notably Pincher Creek, Cowley and Twin Butte, where we arrived on July 18. Here I surveyed a few sections in the southwest quarter of the township, which, although bushy, appears well adapted for farming purposes. I experienced a good deal of wet weather here. Townships 2 and 3, range 29, appear good for grazing purposes, and crops could probably be raised, barring summer frosts. The southerly portion of township 2, range 29, west of the fourth meridian, is very hilly, and covered in places with a dense growth of willow and some poplar, none of any value however. On August 19, moved camp to township 1, range 28, west of the fourth meridian, where a few sections were surveyed, which are, generally speaking, rough and covered with bush. Here also I traversed a small section of Belly river. Wild fruit appears to abound, as many parties from the Mormon settlement to the east were encountered on berrying expeditions, and some fine trout were also caught in Belly river. On August 27, moved camp to section 22, township 1, range 27, west of the fourth meridian, passing on the way some well cultivated fields of grain promising a good return to the Mormon settlers. I surveyed only a few sections in this township (1, r. 27), mostly occupied. Here I closed on the international boundary, which at times I experienced great difficulty in tracing owing to the high winds, which prevented me for hours at a time from elevating my instrument and keeping same in position.

On September 2, I commenced moving north again according to instructions, and passed through Mountain View, a small Mormon settlement, thence past the Northwest Mounted Police post at the Big bend of Belly river to Pincher creek, the garden of this district, to Cowley, thence through Lundbreck to Bellview, near Frank, on the Crow's Nest Pass railway, thence crossing Crow's Nest river to an abandoned shack on the southeast quarter section 17, township 7, range 3, west of the fifth meridian.

SESSIONAL PAPER No. 25b

This country is hilly and mountainous, and as far as I can see, only adapted to coal mining, there being several mines in contemplation and operation. Here in order to reach township 6, range 3, I was compelled to use pack horses and leave my wagons. A good pack trail leads from here to Southfork river, which appears to be well travelled. High winds used to prevail at times on the mountain tops which had the effect, at one careless moment, of blowing over my instrument and breaking the spindle of same. On September 28, I left with my outfit for township 10, range 2, west of the fifth meridian. It was on this trip that the prairie fire occurred which was alluded to in a former report of mine. It is possible that this fire may have been caused through the carelessness of one of my men, but they all denied it, and in order to place the responsibility somewhere, and thus precluding a long investigation, one of my men was persuaded to plead guilty although not more guilty than any of the rest. I arrived at section 19, township 10, range 2, west of the fifth meridian on September 29, took an observation on the west boundary of the township and surveyed sections 19 and 18. Moved camp to section 22, township 10, range 2, and finished surveying the few sections, according to my instructions, also surveyed a few sections in township 11, range 2, west of the fifth meridian. The land in both these townships, occupied as horse and cattle ranches, owing to the proximity of the mountains appears to be not adapted for the raising of cereals. On October 11, we pulled out for township 13, range 2, moving north between Porcupine hills and the foothills. I was here compelled, in order to make time, to enlist the services of a rancher with his team. We got through the following day, passing some new settlers, who appeared sanguine of being able to subsist, in township 13, range 2, west of the fifth meridian. I commenced surveying in this township, but owing to discrepancies in measurements found on the east boundary, postponed completing the survey until I had communicated with your department. I finally returned there on December 5, and finished subdivision according to instructions. Camped on section 36, township 13, range 2, west of the fifth meridian; a snowstorm was experienced, necessitating a delay for a day or two, and when moving, to put on four horses instead of two on the wagon. On October 18, moved camp to northeast corner of township 15, range 2, west of the fifth meridian, subdivided part of township 15, range 1, which is very hilly and brushy, and also part of township 15, range 2, west of the fifth. Both of these townships, although very bushy, are well adapted for horse raising or ranching. Owing to the depth of snow, I could not determine the south boundaries of townships 15, in ranges 1 and 2, and hope to be able to do so at some future time. From the last camp I moved to section 21, township 15, range 2, on November 18, where I remained until the snow got so deep that I could not conveniently or economically move any more by wagon; but, as already mentioned, I moved south on December 5, with six horses attached to one wagon, to finish the subdivision of township 13, range 2, west of the fifth meridian. The whole of my outfit arrived at Nanton on December 12, thence moving to Staveley, and on the 14th I started with a small party for Little Bow river, where we arrived on the evening of the 15th. Here I traversed the Little Bow across sections 10, 3 and 4, township 14, range 23, west of the fourth meridian, returning to Staveley on December 19. The country passed through on my trip to the Little Bow appeared well settled and by comparatively new settlers. After returning to Macleod, I sent out my assistant to township 9, range 27, west of the fourth meridian to take an observation and to measure some closing angles. He arrived in Toronto on December 29, and I paid him off allowing his time up to December 31. As per instructions to store my outfit, I left same with Mr. Robert Esplen, west of Nanton, previously, however, disposing of two horses which were of no further use for the work required of them.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) C. F. MILES, D.L.S.

6-7 EDWARD VII., A. 1907

APPENDIX No. 29 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF WALTER G. McFARLANE, D.L.S.

INSPECTION OF SURVEYS—WESTERN SECTION.

TORONTO, March 15, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit to you the following general report on my past season's work in the provinces of Alberta and Saskatchewan.

My first instructions reached me June 21, 1905, for inspection and retracement surveys, and I at once began to get my outfit ready. However, being advised to spend a day or two in the office before going out, to acquaint myself with the methods, I left Toronto June 25 for Ottawa, and returned to Toronto June 27. The next day I left for Edmonton, reaching my destination July 3, where I completed my outfitting July 6.

The following day I took the Athabaska Landing trail to examine contracts No. 60 and No. 44 of 1904. In contract No. 60, I ran nine miles of line, and in contract No. 44, I ran nine miles of line, and traversed one lake. In this part the country is rolling and usually covered with bush, but a muskeg of considerable size runs across part of it. The bush is mostly jackpine and poplar. Some of the jackpine was being used for railway ties. The soil is very sandy in places, but there is some good black loam in others. The water is fresh. Vermilion creek runs through these contracts, and some places along its banks thin coal seams were found. Moose and deer were seen. I next returned to Edmonton, where I replenished my supplies and sent in my returns, and on July 24, I started down the Calgary trail for contract No. 24 of 1903. On reaching Wetaskiwin I took the Heatherbrae and Iron creek trail, and arrived at our destination July 28. That night three of my horses disappeared. We hunted for them continuously for four weeks before getting any trace of them, and then I was obliged to buy a saddle pony to find them. We were fortunate, however, in having plenty of work to keep us busy without much moving, so that the work was not delayed in the least. Here I was instructed to retrace what lines I thought necessary in order to get the bearings and lengths of all section lines. To do this I ran in all one hundred and fifty-nine miles of line and found the bearings of over one hundred more. I also traversed one lake. The country here is bluffy and rolling. A large ravine with some lakes in it runs across the northwesterly part, but there was no running water. However, water was fairly plentiful in large sloughs and lakes and usually fresh, but as it was a very dry season many of the sloughs were dried up. The soil is good but a little light for dry seasons. The work in this part kept me busy until September 12.

From here I drove across the prairie to the correction line between townships 50 and 51, range 14, west of the fourth meridian. The road allowance was said to be too narrow, and I was instructed to examine it and widen it if the settlers wanted it. On examining it I found the survey correctly made but the road allowance narrow. However some of the settlers objected to having it widened, so I was obliged to leave it.

I then left for township 52, range 12, west of the fourth meridian, to traverse some lakes, and reached there September 22. The lakes were very numerous, and one was exceptionally difficult to do as it was large and full of islands thickly wooded as well as being surrounded by thick bush. It had ten miles of shore line and three miles of island shore line. Here I surveyed twenty-four lakes in all, completing them by October 21. The weather had been unusually fine during the whole summer, but on October 16 a heavy snow and wind storm came on and the thermometer dropped below zero. It was so stormy and cold the next day that we did not work, but this was the only day we lost from bad weather during the season. This township is very rough, and the centre part is thickly wooded. There are quite a number of settlers, however, in the open parts.

SESSIONAL PAPER No. 25b

After finishing here I drove to township 52, range 10, west of the fourth meridian, to survey a lake while my teams took the trail to Lloydminster. This lake only kept me a day, and I then followed my teams, overtaking them the next day. We reached Lloydminster October 27, and spent three days in getting supplies, outfit repaired and horses shod. We then moved up to Saskatchewan river at Hewitt's crossing, but were delayed here, as the river was only partly frozen over and would not carry the horses on the ice. The ferry was pulled out a week before. In a few days I was able to take the pony across on the ice and also to pack the dunnage and supplies across and pull the empty wagons over on it, but it would not bear the horses. The weather was now like Indian summer, and instead of the river freezing more it thawed a little, so I felt that we must find some other way for our horses. I decided to saw a channel through the ice and swim the horses through. We did this, and accomplished our task safely and with apparently no bad results as we ran the horses around on the sandbar to warm them up.

The next day we left for Onion lake, and thence to contract No. 27 of 1904, where we arrived on November 11. My examination of this contract was merely to get the rating, so I chained thirty-two miles of line, finishing November 16. There is some very good land here, considerable open prairie and also a large amount of bush. The water is good.

We next left for Onion lake, where I sent in my report and then proceeded to Saddle lake, and contracts Nos. 13, 14 and 15 of 1905, taking the trail along the north side of the Saskatchewan. We reached our destination November 25. Here we ran ten miles in contract No. 14, fourteen miles in No. 15, and 11 in No. 13, and also traversed one lake in each, completing this on December 8. The country here is in general very rough and covered with bush. The water is bad except in Whitefish and Goodfish lakes and the creeks running into them.

I next started for Edmonton, where I arrived December 14. Here I gave one team back to Mr. Belanger, got the others shod, bought supplies and left December 16 for contract No. 17 of 1905, taking the Lake St. Ann trail. The trail west of Lake St. Ann was very hilly and heavy travelling on account of a foot of snow. Crossing Pembina river, we found it necessary to use chains and ropes. One place we had to unhitch the horses and let the wagons down with a rope. We reached our destination December 20. Here I ran nine miles of line and traversed one lake. There is some good land, but considerable muskeg, and the country is broken up somewhat by Lobstick creek which is very crooked.

We next left for contract No. 12 of 1905, reaching it December 27. Here I ran twelve miles of line and traversed part of Pembina river. The country about here is very good and is covered with a light second growth poplar. The homesteads were all taken by squatters before this was surveyed. There is considerable building timber and sawmills within a few miles.

On December 30, we left for Edmonton where we arrived on New Year's Day. Here I disposed of my outfit, giving my horses to Mr. Cautley and storing the rest. I then started for home where I made out the rest of my returns.

In conclusion, I wish to thank the department for the good transport outfit provided me, but much more for the very worthy assistant, Mr. W. H. Young, appointed by them.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) WALTER G. McFARLANE.

6-7 EDWARD VII., A. 1907

APPENDIX No. 30 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF T. S. NASH, D.L.S.

INSPECTION SURVEYS, EASTERN SECTION.

OTTAWA, ONT., September 5, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on my field operations in connection with the inspection of contract surveys during the season of 1905.

I received my instructions on April 19, 1905, and after preparing the necessary information for my work, left Ottawa on April 28 for Solsgirth, Manitoba, to take over the transport outfit used by Inspector J. D. Craig during the previous season. After making some necessary repairs to the outfit, I proceeded to Birtle to complete the organization of my party. After some delay in getting the necessary equipment, supplies and men together, I started for the addition to contract No. 26 of 1904, near Rossburn, which I reached on May 12.

During this time I saw clearly that my horses, emaciated by the experiences of the past winter, were too weak to draw a loaded wagon even on a graded road, consequently, I purchased another team, as reported at the time, in order to prosecute my work with such expedition as was necessary to cover the large territory allotted to me during the season.

The examination of this contract occupied my time till June 2, and involved the retracement of 70 miles of line in six townships. I then drove northward to Grandview, on the Canadian Northern railway, reaching there on June 5. Here the outfit was loaded on the train and shipped a distance of 180 miles to Quill Lake, the nearest point to contract No. 9 of 1904, which I was to examine next. Owing to wrecks on the line, my car did not reach Quill Lake till June 8.

On the following day I began the examination of contract No. 9 of 1904, in township 37, range 15, west of the 2nd meridian. The country here was nearly level, and for the most part covered with woods and much swampy lands, making transportation very difficult. By doubling on my wagons I was able to take a light outfit as far as the north boundary of township 38, range 15, west of the 2nd meridian. From here I completed the examination of this contract on June 15, having retraced 22 miles of line.

The adjoining contract No. 8, of 1904, was reached by a flying-camp outfit and pack horses, with which I was able to follow the 10th correction line into range 14, thence north across township 39, and eastward between townships 39 and 40 to range 13, following the section lines as far as possible with the pack outfit. Much of this trip was across muskeg, marsh or swamp, where the horses went through to the frost at every step, making the trip a most difficult and arduous one. After retracing 22 miles of this contract, I returned by the same route to the main camp, and reached Quill Lake again on June 24, where I shipped my outfit again by Canadian Northern railway and Caaadian Pacific railway to Duck Lake, a distance of about 130 miles.

From Duck Lake I drove by way of Carlton and the Muskeg Lake mission to the addition to contract No. 23 of 1904, a distance of approximately 50 miles, reaching the contract on June 30. Here again I used the pack saddles for travelling through the contract. After examining 14 miles in township 48, ranges 8 and 9, west of the 3rd meridian, the two townships of the contract, I started on the morning of July 5 for Battleford by way of Muskeg Lake mission, Blain Lake and the Carleton trail, reaching Battleford after 100 miles of travel on July 10.

I then made arrangements to take with me enough supplies for the whole work of examining the contracts in the Sounding Lake district, the distance from there to any point of supplies being too great to send for supplies without great loss of time. Having hired a freighter for the trip, I started on July 13 for the Sounding Lake

SESSIONAL PAPER No. 25b

country, reaching township 34, range 4, west of the 4th meridian, of contract No. 8 of 1905, on July 18.

The progress of the work in this district was retarded by the great scarcity of fuel and fresh water. The only fuel to be found was in the west side of township 34, range 5, west of the 4th meridian, and in Nose hill, in township 37, range 9, west of the 4th meridian, and this in a great measure determined the order in which the work was prosecuted. While working near the supply of wood, a few loads were hauled out to convenient points for future use, and by a careful arrangement of the work no time was lost in having to make long trips for fuel.

After examining the northern part of contract No. 8 and obtaining a supply of fuel, I went southeastward through contract No. 2 of 1905, comprising townships 27 to 30, in ranges 2 and 3, west of the 4th meridian, completing the examination of it on July 31. Then turning westward and northward no new survey was found in contracts Nos. 3 and 4 until reaching township 32, range 6, west of the 4th meridian, where the surveyor was found working in the first township of contract No. 4, and in contract No. 3 the surveyor was just arriving for work. Continuing northward, camp was made in township 33, range 6, west of the 4th meridian, on August 3, from which examination was made in contracts Nos. 8 and 9, and another supply of wood obtained from township 34, range 5, west of the 4th meridian. I then examined contract No. 5 from a camp on Sounding creek, in township 30, range 8, west of the 4th meridian, and completed the examination of contract No. 9 on August 16.

Proceeding to Nose hill, a good supply of fuel was obtained, and the examination of contract No. 10 of 1905 was begun in township 35, range 10, west of the 4th meridian, and continued southwesterly toward contract No. 7. Proceeding southerly through contract No. 7 and northerly and easterly through contract No. 6, the examination of these was completed on September 13. Returning then to contracts Nos. 3 and 4, a careful examination was made in five townships in each contract, the remaining townships in contract No. 4 not being completed yet, on September 30, when I finished my examination of contracts in this district. During the time between July 19 and September 30 the main camp was moved approximately 335 miles, and a total of 449 section lines and over 10 miles of traverse was retraced in the nine contracts, or an average of 51 miles per contract. The number of miles retraced in each contract varied from 41 miles to 60 miles according to the style of the work. Astronomical bearings were obtained for all of this work.

The country between Sounding lake and Sullivan lake and to the southward is high and nearly level or gently rolling, except for a range of hills extending from Nose hill southeastward across the northerly part of contracts 9 and 4 and across the greater part of contracts 8, 3 and 2, of 1905, or generally speaking, from township 36, range 9, west of the 4th meridian, eastward and southward to township 27, ranges 2, 3 and 4, west of the 4th meridian. Some parts of contract No. 7, in range 13, were also hilly. The soil throughout the greater part of this contract was white clay or sand, the vegetation sparse, the water generally alkaline and very scarce, thus rendering it a ranching rather than an agricultural country. Many parts of townships 33 and 34, in range 6, west of the 4th meridian, were suitable for agricultural purposes, being well watered by springs and sloughs and the soil of a better class.

On Monday, October 2, I started for Yellow Grass to examine contract No. 1 of 1905. The Red Deer river was forded at Steerford, and Medicine Hat was reached on October 6. Delay in shipping was caused here by the absence from town of the veterinary surgeon and the brand inspector, whose certificates were necessary before the horses could be loaded on the car. Leaving Medicine Hat on the 9th, the car reached Yellow Grass, approximately 420 miles distant, on the morning of October 11. The examination of this contract was begun on October 13, and finished on October 19, during which time a heavy fall of snow occurred which delayed the work. Fifty miles were retraced in this contract. The country in this contract was level in some parts, others were rolling to hilly, the soil very rich and the vegetation luxuriant, especially in the hills where water was plentiful.

6-7 EDWARD VII., A. 1907

After finishing the work here I drove northward through Milestone and Regina, and by way of the old Piapot trail, through the Touchwood hills, Wishart, Fishing Lake and Wadena to contract No. 11 of 1905, near Nut lake, a distance of approximately 250 miles, reaching the contract on October 30. The examination of this contract was completed on November 1 after retracing 15 miles in township 37, ranges 11 and 10, west second meridian.

My next work was in township 37, range 15, west of the second meridian, but owing to bushy country, deep snow and no trails, it was impossible to go directly across country to this work; so I returned to Wadena and following the Canadian Northern Railway trail to near Quill lake and then turning northward, I reached township 37, range 15, west of the second meridian, on November 4, where according to instructions I retraced 19 miles of line and built several monuments in township 37, range 16, west of the second meridian, the mounding not having been completed by D.L.S. Martin in 1903. Leaving here again on November 13, I reached Wadena on the 14th, from which point I shipped the outfit by Canadian Northern railway to Marchand in Southern Manitoba, a distance of, approximately, 410 miles. Reaching Marchand on the 17th, the examination of contract No. 16 of 1905, was immediately begun and was completed on November 25, after retracing 22 miles of line in three townships. During this work nearly a foot of snow fell and severe winter set in, making progress with wagons and a summer outfit extremely difficult for the few remaining days of the season's work.

On November 27, I started for the additions to contracts Nos. 17 and 25 of 1904, following the Dawson road to the Whitemouth river and thence northward along a winter trail to townships 8 and 9, range 12, east of the principal meridian. After retracing 5 miles in contract No. 25 and 6 miles in contract No. 17, I returned to Ste. Anne des Chenes again, reaching there on December 5. The season's work being finished, I sold my horses by private sale, stored my outfit with James Finnigan, of Ste. Anne des Chenes, and discharged my party.

During the season 18 contracts were examined, ten being on bare prairie and eight being in bush country. These were scattered over a very large area extending from the International boundary to township 48, and from range 13, east of the principal meridian to range 13, west of the 4th meridian. This necessitated many long trips both by trail and by train. The outfit was transported four times by train over a total distance of approximately 1,140 miles, while the distance travelled by trail, not including side trips, was approximately 1,450 miles. The examination of the 18 contracts involved the retracement of 674 section lines and over 10 miles of traverse. In addition to this, 19 miles of retracement survey was made, making a total of 703 miles of survey for the season. Astronomical bearings were obtained for all of these with the exception of 27 miles retraced during stormy weather in June and November.

The greatest care was always taken with the astronomical work to insure accurate results. The sidereal time was almost invariably checked by the transit of a time-star within an hour of the time of observation, thus eliminating any chronometric error. When, in observing time-stars, the instrument was not known to be in the true meridian, the time of transit of the time-star was noted on each of three vertical wires in my diaphragm whose angular distance apart was known, and thus I was able to deduce the watch time of the transit of the time-star across the true meridian and thus obtain the true watch correction to the nearest second. This accurate time correction insured an accurate bearing, more especially when the observation on Polaris was taken near culmination.

In conclusion, I wish to express my appreciation of the valuable services of Mr. J. E. Morrier, who was appointed to my party and acted as assistant.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) T. S. NASH, D.L.S.

SESSIONAL PAPER No. 25b

APPENDIX No. 31 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF GEO. ROSS, D.L.S.

MISCELLANEOUS SURVEYS IN SASKATCHEWAN.

WELLAND, ONT., May 1, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my work during the past season in connection with the different surveys allotted to me under your instructions of April, 1905, and those of subsequent dates.

Mr. H. S. Southworth, of Toronto, was appointed my assistant, and together with another member of my party, who was appointed by the department, were attending the School of Practical Science in Toronto, and could not leave till near the end of April, and Mr. Southworth also wished to write on his preliminary examination before the Board of Dominion Land Surveyors, and would be unable to start from Toronto before May 4, I therefore did not leave home till the first of May, and arrived in Yorkton, where I was to outfit, on the fifth. For transport, I was to take part of the outfit used by Mr. P. R. A. Belanger, D.L.S., the season before, and which was stored with Mr. R. Laurie, near Insinger, Assa. Mr. Belanger assigned to me, one wagon, three carts, with harness, &c., and eight horses. I purchased a buckboard and supplies at Yorkton, and left for Sheho on the 12th., and set out from there the following day, with the party, to make a restoration survey of the interior and south boundary of township 27, range 12, west of the second meridian, and camped on section 22, in that township, about noon on the 16th. We found quite a thriving settlement in this township, the greater number of quarter-sections, open for homesteading, had apparently been entered for, and a considerable number of settlers had erected houses and outbuildings, of a permanent character, and were busily engaged in cultivating the soil, and were much pleased with their surroundings. The surface consists mainly of rolling prairie, with many scattered poplar bluffs, and is broken with ponds and marshes, but there are many stretches of very desirable land, with black loam soil, well adapted for grain growing, and the greater portion of the township is well adapted for mixed farming. There are no streams of any account, but the water in the ponds and marshes is fresh, and good water can be readily obtained from wells. Horse lake is a beautiful sheet of water in the northeastern portion of the township, and from which the surrounding settlement takes its name. In the vicinity of Horse lake there is a considerable quantity of good building timber.

In the original subdivision survey of this township, wooden posts were planted, and generally their accompanying mounds and pits, but in several places, especially where the section or quarter-section corners came in brush or timber, a wooden post only was planted, and these posts, where no mound was made, were decayed and fallen, so that in several instances the settlers were unable to locate the corners of their homesteads, and a few on this account had wrongly located their buildings. In a few other cases the monuments were located in low places, and were entirely covered with water. This also led to further inconvenience for the settlers, and made the restoration survey the more urgent. I completed the restoration survey of this township on June 14, having planted iron posts to mark the section corners, instead of the old wooden ones, and restored the quarter-section monuments, or remarked them, where the original corners could not be found, but in two or three cases the original quarter-section corners were found to be wrongly placed. These were destroyed, and new monuments made to properly divide the section.

We left township 27, range 12, on June 15, to retrace the north boundary of section 23, township 29, range 25, west of the second meridian, to determine its bearing, and arrived there on June 20, but that evening was too cloudy to take an observation, and I remained over and got the observation on the evening of the 21st.

6-7 EDWARD VII., A. 1907

On the following morning, I started out with the party to go to township 39, range 28, west of the second meridian, to destroy the I.P. pits wrongly placed in the road allowance, near the northeast corner of section 33, in that township, and went there by way of the town of Humboldt. We passed through this town on June 24. It is located on the Canadian Northern Railway, and although a post office was only about to be opened there, it was a well laid out and progressive town of considerable size, and surrounded by a new and prosperous settlement.

I destroyed the I.P. pits referred to, and restored the original monument at the northeast corner of section 33, township 39, range 28, on June 27, and then set out to traverse some lakes in township 40, ranges 23 and 24, west of the second meridian, passing through Leofeld, where we camped on the evening of the 27th. This is a small village located near Boucher lake, lying in the midst of a very prosperous German Catholic settlement.

We reached the north part of township 40, range 24, on June 29, and first traversed the lake in sections 31 and 32. This lake is surrounded by good prairie land, and the homesteads are taken up by a thrifty and well-to-do class of settlers, who appear to be much pleased with their location. A short distance to the west is a heavy belt of poplar timber, and we were camped on the western edge of this belt. On July 3 we set out to traverse the portion of the lake in section 6, township 41, range 23, and in section 1, township 41, range 24, not previously traversed by the surveyors who subdivided these townships, and also to traverse the lake in sections 31 and 32, in township 40, range 23, and sections 5 and 6, in township 41, range 23, together with that portion of Dill lake, in sections 32, 33, 28 and 29, in township 40, range 23. These three lakes lie in the midst of the thick belt of poplar woods, and it was necessary to pack our tent and provisions for the working party from our main camp on section 4, in township 41, range 24. No trouble was found in making a micrometer survey of the two former lakes, but Dill lake was so very irregular in shape, consisting of many long bays, with narrow tongues of land jutting between them, and the shores of the lake were thickly wooded, with brush extending into the rapidly deepening water, together with a tangle of dry fallen timber back from the shore, that it was impossible to make any material progress with the traverse. The lake is studded with a large number of islands, and I decided to make a raft, so that sights might be taken from stations on these islands, but when the raft was finished and tried, it was found to be unmanageable in any wind, as a short distance out from the shore bottom could not be touched with a pole thirty feet long, so I decided to abandon the traverse of this lake till I could secure a canoe.

On July 8 we took the trail for Humboldt, on our way to traverse the marshy lake in the western part of township 38, range 18, west of the 2nd meridian, and arrived at this lake on July 11. It is a rather shallow lake, occupying the eastern portions of sections 7, 18 and 19, the western portions of sections 8, 17 and 20, together with the southwest part of section 29 and the southeast part of section 30. The east part of section 31 and the northwest part of section 30, together with the west part of section 32 and the northwest part of section 29 are flooded by a creek of considerable size, running into the lake from the north, and the waste land along the creek in these sections was also included in the traverse. The lake proper has well defined banks, and the waters of the lake are confined within its bed, but over a considerable portion of its area there is a heavy growth of reeds. In making the traverse of this lake I found that the monument marking the northeast corner of section 31 was wrongly placed, and destroyed it, and made a witness monument to mark the correct corner.

On July 15, we traversed the portion of Lac Vert in section 3, township 41, range 18, west of the second meridian. This is a beautiful small lake with good water, having on its west and north sides, a belt of poplar timber, and patches of prairie on its east side. There were no settlers in the immediate vicinity of this lake, but the country is well adapted for mixed farming, and large quantities of hay can be readily obtained. The large supply of good poplar timber in this vicinity will also be of much value to settlers.

SESSIONAL PAPER No. 25b

On July 17, I started with the party to traverse the portion of the large lake extending into the easterly part of township 40, range 20, from the north, but owing to the broken and wooded country, that would have to be passed through, were we to go there direct, we made a detour to the south, and arrived there the following day. This township was subdivided in 1902, when the water was apparently much higher than it was last season. Then the lake must have overflowed its banks, and flooded a considerable area of the adjoining low lands to the east and south. Last season it was confined to its bed and had well defined banks, but it is very shallow, and inclined to dry up at the south end. We completed the traverse of this lake on July 22, and I then proceeded to Humboldt, and received a telegram from you instructing me to make a retracement survey of townships 31 and 32, ranges 24 and 25, west of the second meridian, and as the canoe I had ordered from Winnipeg, for the purpose of completing the traverse of Dill lake, had not yet arrived, I went on with my party to township 32, range 24, and began its retracement on the 26th, and completed the retracement of the four townships mentioned on August 22. These townships lie in the vicinity of Little Manito lake, which is a beautiful sheet of salt water, about thirteen miles long and a half a mile wide, being located in a deep valley and having no outlet. It has a fine gravelly, or sandy bottom and is unrivalled for bathing. The surrounding country is being rapidly brought under cultivation, and the settlers, generally were much pleased with their prospects. Splendid crops of wheat and oats were harvested last season, and large quantities of hay can be readily obtained from the hay meadows and marshes, and there is also a large number of good poplar timber in townships 31 and 32, in range 25.

On July 26, I received your letter, dated the 20th, instructing me also to retrace the portion of township 32, range 26, lying north of Little Manito lake, together with the fractional townships 31 and 32, range 29, west of the second meridian, and completed the work in these three townships, on August 31. The portion of township 32, range 26, lying north of Little Manito lake, is rather stony, but is being taken up by a good class of settlers, but fractional township 31, and the south part of township 32, range 29, is rather rough and hilly and no settlers were found in either of these townships, but they are extensively used for grazing lands.

On September 1, we started to complete the traverse of Dill lake, having previously obtained the canoe ordered for that purpose, and passing through Humboldt, and thence north by the east side of Dead Moose lake, and by a trail made by the settlers, to the west side of Dirtywater lake, leading to Middle lake for the purpose of going to fish there, we reached a point near the northeast corner of township 40, range 23, and thence by clearing out the surveyed line along the north boundary of this township, we were able to pass through the poplar woods and camp at the lake itself, where we found a hay meadow where the horses could feed, although all the other hay meadows, along the margin of this lake had been covered by the high water, and now formed part of the lake. Although the portion of Dill lake, lying in township 40, range 23, is only about equal in area to one section, it has a shore line of about twenty-six miles, and appears to be made up of a number of ponds, or small lakes, connected by narrow channels, in some of which there is dead, or dying brush, and some of the channels are only about wide enough to afford safe passage for a canoe. This lake still appears to be increasing in size, and additional channels are being worn to many small bodies of water in the immediate vicinity of the lake. Considerable portions of the surrounding lands are quite high and bluff, and the greater portion of the lake is very deep. The lake has no outlet, but the water is fresh and good. We completed its survey on September 12, and then returned to Humboldt, where I received instructions from you, dated August 23, to make further miscellaneous surveys, west of Saskatoon. We went on to that town and arrived there on September 19. Here I reduced my party by one man, leaving it eight in number.

On September 22, we traversed the portion of the lake in section 31, township 36, range 13, west of the third meridian. The water in this lake is very alkaline. On the 23rd I renewed the iron post marking the northeast corner of section 12, township 36,

6-7 EDWARD VII., A. 1907

range 12; on the 26th we traversed a lake in sections 11 and 12, township 36, range 15, and on the 27th we traversed that portion of the lake lying in sections 6 and 7, township 36, range 14. The water in the latter lake is fresh and good, and it lies in a first-class agricultural district, but no settlers were found in its vicinity. Leaving township 36, range 14, we passed north across the country, through an unsettled district, to traverse portions of two small lakes in township 40, range 15, which lie a short distance east of the Red Pheasant Indian reserve. From this township, we went to traverse the portion of the lake extending into sections 35 and 36, in township 44, range 14, west of the 3rd meridian, from township 45, range 14, and crossed Saskatchewan river by the ferry at Battleford. The water in the lake in sections 35 and 36 is alkaline and rather shallow, and in periods of drouth it would probably dry up, although it has a well defined bed and bank. We completed the traverse of this lake on October 4, and leaving there the next morning, we arrived at Battleford in the evening, and on the following morning took the Sounding lake trail to the southwest, and traversed the portion of a lake in section 6, township 41, range 23, west of the 3rd meridian, on October 10. On the 12th we destroyed the Wit. I. P. T. planted in the road allowance near the northeast corner of section 24, township 39, range 26, and made another monument to mark this corner, in accordance with the provisions of the Manual, and then went south, across country, through a rather hilly and broken district, without settlers, and on the following day corrected the quarter-section monument on the north boundary of section 36, township 35, range 27; then went north again across country to Manito lake, and on October 18 surveying the east boundaries of sections 4 and 9, in township 43, range 26, west of the third meridian, as these lines were not run by the surveyor who subdivided this township. The soil here is sand, or very light sandy loam, and does not appear to be of much value for either grain growing or grazing, but in this vicinity there are large quantities of poplar timber, suitable for building and fuel.

On October 21 we traversed the portion of the lake in section 1, township 43, range 23, west of the 3rd meridian, which had been omitted by the subdivider, and then returned to Battleford, where I received your letter, dated October 11, directing me to store my transport outfit for the winter when I had completed the surveys which had been allotted to me. I also received your letter of September 30, informing me that instructions for further miscellaneous surveys were being prepared, and would be forwarded to me, but these never came to hand, and as the weather had become inclement, the ground being frozen, and there were frequent snowstorms, I decided to return to Yorkton and disband the party, and arrived at Saskatoon on my way there on October 27, but the next day there was so much ice in the South Saskatchewan that the ferry could not run, and I disbanded my party at Saskatoon, retaining one man, who went with me to retrace the boundaries of two sections in township 31, range 25, west of the 2nd meridian, which work I completed on November 1, and then returned home.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) GEO. ROSS, *D.L.S.*

SESSIONAL PAPER No. 25b

APPENDIX No. 32 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF JOS. E. ROSS, D.L.S.MISCELLANEOUS SURVEYS IN THE EASTERLY PORTION OF THE RAILWAY BELT IN
BRITISH COLUMBIA.E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

OTTAWA,

1906.

SIR,—I have the honour to submit the following report of the surveys performed by me in the easterly portion of the railway belt in British Columbia during the season of 1905.

I began the season's operations by surveying a number of sections on the north and south sides of Kamloops lake. I then was engaged for several weeks marking more permanently section corners in the valley of Columbia river between Golden and the southerly limit of the railway belt. After this I spent several months on the survey of part of the limit of the railway belt on the south side of Spillimacheen river. The country here generally is mountainous, ranging from 5,000 to 7,000 feet above sea level. The only breaks in the mountains were the valleys of the south branch of the Spillimacheen and Copper creek. In order to make a complete circuit as a check, I ran a line from Carbonate Landing, on Columbia river, to connect with the limit of the belt. The latter line ran through a less mountainous country, and followed as closely as possible the old pack trail.

Spillimacheen river, of which there are three main branches, is a swift stream with waterfalls, canyons and rapids. It is not navigable, but logs can be taken down it with some difficulty. The width varies from a chain to three chains. There is very little land in the Spillimacheen district fit for agriculture. The greater part of the timber has been burnt. The remaining unburnt portion begins about two miles below the junction of the middle and south branches and extends up stream as far as seen, with a width varying from a mile to three miles. Jackpine predominates, but the only valuable timber for lumber is spruce and fir. The timber is not large, a great deal of it being only fit for piles, ties, telegraph poles and such like. The top of the higher mountains is mostly bare, soft slate rock. The survey of the belt line was slow as our provisions and outfit had to be packed on our backs and trails had to be cut out. There is a rough wagon road up the main Spillimacheen for a distance of fifteen miles, but the upper portions can only be reached by pack trail from Carbonate Landing on Columbia river. It is claimed that there are some promising prospects in the district but so far none have developed into mines.

On finishing here I made a small survey at Three Valley lake. I then proceeded to Shuswap lake where I made a number of surveys, nearly encircling the whole lake. After this I proceeded down the south Thompson river, making small surveys every few miles until I reached Kamloops, when I quit operations for the season.

The country in the Kamloops district has so often been described in these reports that any particular description will be unnecessary. Around Three Valley lake the country is mountainous and rocky. It is generally well wooded, but the timber had been almost completely burnt off the part surveyed. There is almost no agricultural land. A sawmill has been built at the lower end of the land and a small village is springing up as a result of the lumber business.

Around Shuswap lake the country is mostly steep hill-side, but in a few places the ground slopes gradually and gently to the lake. Except where swept by fire it is well wooded with small timber. The surveys made were mostly to meet the requirements of settlers. The agricultural land is comparatively small and of second and third class quality.

Along Thompson river there are also a few flats not yet taken up, but they need

6-7 EDWARD VII., A. 1907

to be irrigated. Considerable time was taken up, here, in locating provincial lots on account of the original survey marks having been lost.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) JOS. E. ROSS, *D.L.S.*

APPENDIX No. 33 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF ARTHUR SAINT CYR, *D.L.S.*

SURVEYS IN THE PEACE RIVER DISTRICT.

OTTAWA, February 6, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to transmit the report of my operations in the Peace River district during the past year.

In the latter part of December, 1904, on my return from the eighteenth base line where I had gone to 'cache' supplies intended for use during the following summer, I received your telegram requesting me to take up the survey of the nineteenth base line at range fourteen, west of the fifth meridian and to produce this line westward to the sixth meridian, a distance of seventy-two miles. I immediately began the necessary preparations for this survey.

During the summer of 1904, I had put up at Prairie river, forty tons of hay for use on the survey the following winter. As this hay had to be hauled a long distance, it was necessary to have it baled. I arranged with Sidney Travers, the owner of a hay press at Stony Point, to attend to this matter. Regarding the transport of the camp outfit, I had concluded that five horses, if well cared for, would be able to keep it abreast of the survey. The other horses were therefore left at Andrew's ranch in charge of one of my men who was instructed to bring the mail and supplies at stated intervals.

On January 12, 1905, I left Prairie River post, where the bulk of my supplies were stored. Travelling over the old winter trail which leads to Sucker Creek Indian reserve, I came to the south shore of Lesser Slave lake, which I followed southward to the beginning of Chalmer's wagon road. As this road had not been used for years I had to improve it before I reached, with my outfit, the nineteenth base line which is crossed in section 35, township 72, range 14. Then turning west, I made a new road through the woods as far as the northeast corner of range 15, established by Mr. Edgar Bray, *D.L.S.*, in the fall of 1904.

The winter of 1904-05 proved to be an exceptional one for this district, for towards the end of February warm winds brought on copious rains, so that in the beginning of March all the snow had disappeared and I was left with my sleds on bare ground. This happened at the most critical part of the work, being then at the furthest from my base of supplies.

Though much hampered by this unfavourable occurrence, the survey was pushed with all diligence, and the nineteenth base line was completed on May 12, when I returned to Sturgeon Lake trading post in order to prepare for the continuation of the survey of the sixth meridian as far south as the sixteenth base line.

The following is a description of the country adjoining the 19th base line, from range 15 to range 27 inclusive, west of the fifth meridian :—

SESSIONAL PAPER No. 25b

The nineteenth base line traverses a country which has a mean elevation of 2,200 feet above the sea, and is heavily timbered with spruce, balsam fir, Banksian pine, poplar and birch. Tamaracs were also seen in different places, but none of very large size. In the low lands, in the valleys and along the banks of the rivers, thick alders and willows and balm of Gilead and large cottonwood are found. The surface varies from undulating to heavy rolling, and is drained by numerous streams, all flowing north. The largest ones are East Prairie river, West Prairie river and Little Smoky river. The two Prairie rivers are tributaries to South Heart river, which they join at five and twelve miles respectively from its estuary at the head of Lesser Slave lake. Both rivers are easily forded at all times, excepting possibly during the spring freshets, which, however, are of short duration. West Prairie river has high and steep cut banks; but I cut these down and graded them, so that the crossing of this river offers now no difficulty with loaded wagons. Along the banks of this river I noticed some drift coal. In their lower reaches these streams wind through an open and fertile level country which is being settled. Last year good crops of oats, potatoes, carrots, cabbage, onions, &c., were raised, and were sold at remunerative prices.

East Prairie river, which crosses the nineteenth base line in the middle of section 32, township 72, range 15, is fifty yards wide at that point. It has a stony bottom, swift current and banks twenty feet high. Its course is very tortuous. East of the river are muskegs, which extend back for a considerable distance. West of it the land is also low and swampy for three miles, then it rises gradually to section 31, range 16, which is the divide.

In ranges 15 and 16 the soil is a grey silt and a black or sandy loam from four to eight inches deep, overlying a subsoil of sand and gravel or stones. The land is undulating, with a general down slope to the north, and is wooded with poplar, balm of Gilead and birch, with thick alders and willow underbrush. Narrow belts of spruce from six to twelve inches in diameter are found around the marshes.

An Indian pack trail from Sucker Creek Indian reserve crosses the nineteenth base line at the northeast corner of section 35, range 15. Eight miles and a half farther west an old pack trail leading to Prairie River settlement intersects also this line. West Prairie river flows also from the south through range 17, and at its intersection with the base line in section 32 is forty-five yards wide, with sluggish current and low banks. Drift coal was seen along this stream. East of it, low and swampy lands stretch two miles and a quarter, whilst on the west side they extend to a branch of Iroquois river, which runs along the foot of Hunters mountain, whose highest point on the line occurs in section 31, range 18. A short distance west of that stream the line meets the winter road from Lesser Slave lake to Sturgeon Lake post via Snipe lake.

Hunters mountain lies mostly in townships 71, 72 and 73, ranges 17 and 18, and is heavily timbered with spruce 8 inches to 30 inches in diameter. Much of this timber is straight and free of limbs for forty or fifty feet from the ground. Some very bad windfalls were encountered here and much time was spent in exploring and in cutting roads passable for the outfit.

In these mountains rise many streams which go to feed Iroquois river, and also Stony creek which winds its course southward along their western base.

In ranges 18 and 19 the soil is a sandy loam four to eight inches deep over a heavy clay subsoil. The surface is undulating or rolling, and is stony in sections 33 and 34, range 19. This sort of country and soil extends also beyond Little Smoky river, an important tributary of Big Smoky river flowing in a broad valley west of the sixth meridian. The first mentioned stream is met at the northeast corner of section 35, township 72, range 20. It is at that point 140 yards wide. At half a mile north of the line the main wagon road from Lesser Slave lake descends to the river, which is here forded over a gravel bar extending diagonally from shore to shore.

In section 36, range 20, a descent of 150 feet from the high lands to the river flats takes place. Across these flats, which extend northward, flows Snipe creek which meets the Little Smoky less than a mile north of the line. The land is partly prairie with

6-7 EDWARD VII., A. 1907

clumps of scrub poplar and willows. Snipe creek is the outlet of Snipe lake which is five miles long by four and a half wide. It occupies township 71, range 18, and is on the height of land between West Prairie river and the Little Smoky. The country north and west of the lake is level, whilst to the south and east are seen ranges of high hills. Some are heavily wooded whilst on others the timber is fire-killed. The winter road which passes by Snipe lake comes to the Little Smoky at about eleven miles south of the nineteenth base line. As this road was originally located across a low and marshy country where lakes and ponds occur at convenient intervals it is used in the winter by the freighters in preference to the wagon road, and for this reason I followed it in December, 1904, when taking supplies to the eighteenth base line. On this trip when coming to the Little Smoky, I made use of the ice and though the river was still open in many places, I managed to get along without mishap. The distance travelled was twenty-seven miles by the meandering of the stream, though it is not more than twelve miles in a straight line. In that distance the river received two tributaries from the southeast: Sweathouse river, which is one chain wide and empties into the Little Smoky, at two miles south of the winter trail, and Goose river which joins the Little Smoky at two and one-half miles north of the 18th base line. Goose river is only 30 yards wide at its mouth, but three miles up stream its width is nearly doubled. A pack trail from Sturgeon lake post leads across country to a point on Smoky river nearly opposite the mouth of Goose river. The average width of Smoky river is 120 yards, and in many places its banks are precipitous. There are many rapids, but only one island between the winter road and the 18th base. The hills on either side of the valley are partly denuded of timber and their height gradually diminishes as one proceeds up stream, so that beyond Goose river the country as seen from the river appears to be more level and is here timbered with spruce, six to twelve inches in diameter, and poplar.

From the northeast corner of range 20, the nineteenth base was carried across the Little Smoky and produced across flats a quarter of a mile wide, after which the line ascends gradually to the top of some hills 150 feet above the valley of the river. From that point and through ranges 20, 21 and 22, the country is nearly level and timbered with spruce, poplar and birch. There are large areas covered with bad windfalls. The soil is a sandy or black loam four to ten inches deep, with a good clay subsoil. There are also a few small muskegs.

At the northeast corner of township 72, range 22, the line crosses a stream, which empties into the Smoky after receiving a tributary flowing out of a small lake located close to the north boundary of section 35. Along this stream there is some prairie land with first-class soil. In section 36, range 22, there is an old trail which years ago was used by the Indians on their travels between Sturgeon lake and Lesser Slave lake via Iroquois river.

In range 23, the line runs over the north slope of Sturgeon mountain at an altitude of 2,900 feet above the sea and enters a hilly country with many streams flowing in deep ravines towards Wabatonisk (White Earth) creek, which discharges also into Little Smoky river. A second pack trail which is a west branch of the one seen in section 36 follows along the creek and after passing over Sturgeon mountain, leads to the outlet of Sturgeon lake, less than two miles from the trading post.

Range 23 is heavily wooded with spruce and Banksian pine, six to thirty inches in diameter. Half a mile south of the north boundary of sections 32 and 33, range 24, lies Reeds (Paskwaskao) lake, the source of Reeds river, which on its course to Big Smoky river crosses the nineteenth base in the middle of section 32, and twenty miles farther on, the sixth meridian at one mile south of the northeast corner of township 74. Hay meadows surround Reeds lake and any quantity of red top can be cut here. The new pack trail from Sturgeon lake to Spirit river via Birch hills, passes close to the north shore of this lake. To go to Sturgeon lake trading post over this trail it is necessary to cross the lake at the 'narrows' which are one-third of a mile wide with deep water; a dangerous crossing in stormy weather and to be avoided.

SESSIONAL PAPER No. 25b

West of Reeds river the land is low and swampy. In range 24, the ground rises again and high hills separated by deep ravines are found as far west as section 32, range 26, where the line descends into a valley which for a few miles runs parallel with the sixth meridian. All the timber is fire-killed, and most of it lies on the ground in an impassable tangle. Numerous streams, crossed by the line, in sections 33, 34 and 35, range 26, flow south towards large marshes at distances varying from two to three miles from the base. The soil in township 72, range 24, is a clay loam, whilst in ranges 25 and 26 it is a black or sandy loam five to twelve inches deep with a clay, or clay and stones subsoil.

In closing with the survey, the nineteenth base line was found to intersect the sixth meridian at 77.215 chains (straight measurement) west of the northeast corner of section 31, township 72, range 26, west of the fifth meridian and at 18.435 chains north of the monument marking the northeast corner of township 72, on the sixth meridian. The angle measured between the lines shows that they have been run on their proper azimuth.

Six days were required to complete the survey in the vicinity of the meridian and the mounding of the base line to range 23 where a wagon road had to be made southerly as far as the east shore of Sturgeon lake, distant twelve miles. Owing to the low stage of water it was possible to travel with the wagons along the east shore of the lake to within one mile of the post, where we arrived on May 20.

Men were at once sent to Prairie River settlement with instructions to bring the remaining pack animals which had been wintered there and supplies necessary to continue the survey of the sixth meridian, which had been interrupted for lack of feed for the horses late in the fall of 1904. On May 30 the pack animals and supplies expected from Stony Point having arrived, I started for township 64, on the sixth meridian, over a road which crosses the eighteenth base line at the northeast corner of township 68, range 24, west of the fifth. Thence proceeding southerly across a densely wooded country, past Long lake and two other smaller ones, we came to Bonnie lake, where we camped on May 31. From this lake the road ascends to the top of a high bench overlooking a stream flowing northwest into Muskeg creek. This bench soon gives place to high gravelly ridges of Banksian and black pines, alternating with strips of burnt country, till Kinagami creek, flowing between hills 150 feet high, is reached. After fording this stream and a stiff climb to the top of the hills, we continued our journey in a more southwesterly direction, passing close to the edge of a large spruce muskeg, finally entering a high country wooded with small pines. We stopped over night at Salt Lick lake, a fine camping place and the last bit of open country seen along this trail.

Beyond this lake the land continues rolling, and it is covered with poplar and willow scrub. The trail approaches gradually to the edge of the broad valley of the Simonette, where glimpses of the river could be obtained. The path now turns southerly along the crest of the hills, which it follows quite a distance before leading down the steep descent to the river three hundred feet below.

At the ford the river is over one hundred yards wide, and has a very swift current running over a stony bottom. At this point there is also an island close to the right bank. The elevation of the valley is 2,100 feet above the sea. West of the Simonette we proceeded for half a mile along its left bank, where after ascending high and steep hills we entered a dense forest with ground covered with thick moss. On June 3, after travelling till late at night in search of feed for the horses, we stopped near some small ponds hedged in by hills whose slopes were strewn with fire-killed trees. There was a scarcity of grass in this spot, and during the night the horses wandered far in the hills. The next morning after a long search one of them was found dead. In rolling over the ground he had got his head under a dead tree and had choked in his effort to extricate himself.

From that camp we continued our trip more to the west, crossing a succession of pine ridges rising to 3,000 feet above the sea, and many muskegs. At four miles east of the sixth meridian we came to the valley of 'Cache' creek, a branch of Moose river.

6-7 EDWARD VII., A. 1907

This valley is narrow, and at frequent intervals the creek expands into artificial ponds caused by recently built beaver dams. The trail, which here follows the north side of this valley, led us to the sixth meridian, and less than three-quarters of a mile from the beginning of my survey, which was resumed on June 12.

Between the northeast corner of township 64 to the crossing of the Simonette, a distance of eight miles and a half on the meridian, are ranges of high hills separated by narrow valleys, with streams flowing westerly and probably emptying into Moose river, a tributary of the Simonette, which it joins in section 12, township 69.

The soil through this belt is covered with moss and is of an inferior quality. The timber is black pine, spruce and balsam fir from six inches to fifteen inches diameter. Spruce trees twenty-four inches in diameter were noticed in sections 36, 25 and 24, in township 63, adjoining the Simonette, which runs easterly between hills 300 feet high.

Simonette river crosses the sixth meridian in section 24, township 63, and its width at that point is 150 yards. It has a swift current, and receives here a tributary from the south. From the river the country continues hilly as far as the sixteenth correction line, but the soil improves, being a good clay loam bearing a second growth of poplar. Here are some very bad windfalls; stones were also noticed at many places. This rolling country with clayey soil continues through part of township 62. The ground rises gradually, till in section 12 it has an elevation of 3,800 feet above the sea. An important branch of Simonette river crosses the line at the northeast corner of township 61 at an altitude of 3,000 feet. This stream runs swiftly between high cut banks where ledges of sandstone are exposed. There are also indications of coal.

Beyond this river the line passes over the top of high hills with steep slopes, and crosses many deep ravines filled with fallen timber. In the vicinity of the sixteenth base line the pine ridges reappear with the ordinary accompaniment of muskeg and poor soil. On July 25 the survey of the sixth had been carried to this base line, which it intersects at 78.49 chains west of the northeast corner of section 33, township 60, range 27, west of the fifth meridian, and at 15.24 chains north of the northeast corner of township 60, on the sixth meridian.

The angle formed by the two lines being found to be correct, I completed the survey of the 16th base line by connecting with a straight line the corner of township 60, range 27, and the monument erected on the meridian, and in mounding it. On August 9, having also built all monuments on the east boundaries of townships 61, 62, 63 and 64, I began the survey of the 17th base eastward from the sixth meridian. The width of fractional township 64, range 27, was deduced from the closings of the 16th and 19th base lines with the meridian. The north boundary of this township runs through a hilly and dense'y wooded country dotted with lakes, two of the largest being found close to the north boundary of section 36. The soil is a sandy or a clay loam, with a subsoil of heavy clay. In township 64, range 26, the soil is the same as in the preceding. The timber is, however, of better growth with a heavier undergrowth. The watershed between Moose and Simonette rivers occurs in section 33.

Simonette river crosses the seventeenth base line in section 32, township 64, range 25. Its wooded valley is nearly 400 feet below the general elevation of the adjoining country. East of the river a flat, half a mile wide, extends to an old channel skirting the foot of the hills. From the quantity of drift wood and fresh mud deposited on this flat I inferred that it was subject to floods. East of this channel the line ascends gradually through sections 33 and 34 when an altitude of 2,400 feet is reached. From sections 25, the line runs across an old *brulé* extending ten miles east of Waskahigan (House) river. Section 32, range 24, forms the divide between Simonette and Waskahigan rivers which crosses the 17th base line in section 33, range 23. Between these rivers the country is rolling with loamy soil and clay subsoil. A stream discharging a lake to the west is reported to join this river at ten miles south of the base line. At their confluence houses were erected years ago by some parties; hence its name. Waskahigan river is thirty yards wide on the line and at the time of the survey (September) the water was two feet and a half deep. Its course is frequently ob-

SESSIONAL PAPER No. 25b

structed by great blocks of sandstone. There are many indications of coal in this vicinity.

One mile and a half east of the river there is a trail leading north towards Sturgeon lake. A west branch to this trail starts at a mile and a half north of the 17th base line which it intersects farther west near the northeast corner of section 31, township 64, range 23; from that point it continues along a creek, crossing it at a mile and a quarter south of the corner of section 35. Thence the trail deviates towards the southwest and goes probably to the head waters of Simonette river. In section 34, township 64, range 23, west of the fifth meridian, the land attains an altitude of 2,500 feet. It is timbered with poplar four inches to eight inches in diameter, spruce six inches to twelve inches, and balsam of Gilead. The soil is good. At one mile east of range 23 railway survey lines were noticed close to another stream which meets Waskahigan river at two-thirds of a mile north of the base. East of this stream rises a very high ridge whose slopes and top are well wooded and which forms probably the watershed of Little Smoky river which is not very distant.

The mounding of the north boundary of township 64, range 23 finished the survey of the 17th base line for the season, and I prepared to return to Sturgeon lake by a new road which would afford me the opportunity of exploring the country between the seventeenth and the eighteenth base lines.

On September 18, we left our camp on Waskahigan river, and travelled northward over the trail which intersects the 17th base in the middle of range 23, west of the fifth. This trail at first runs along the left bank of the river for about three-quarters of a mile; thence it ascends to a plateau where we passed the junction of the western trail. One-half mile further on we came again to other railway surveys which are the continuation of those noticed at the northeast corner of section 31, township 64, range 22, west of the fifth meridian. These survey lines appear to have been run in a general northwest direction and were probably surveyed two or three years ago by the engineers of the Transcontinental. This far the country had been hilly, but shortly after we descended into a valley leading to a large meadow watered by a creek. The soil here is a good clay loam.

On leaving this flat, the trail skirts the foot of high hills rising to the east, whilst to the west are low ridges separated by willow swamps. We camped that night at a creek with some prairie land along its banks. From that camp the country is more level though thickly wooded. The forest extends north to within half a mile of the 18th base line which the trail crosses near the corner of section 34, township 68, range 23. Not far from this base, other exploratory lines were surveyed last summer.

At three and three-quarter miles farther we came to the old Lake St. Ann and Sturgeon lake trail, which we followed as far as Sturgeon lake trading post, where we arrived on September 22.

Around the post renewed attempts at cultivation had been made with satisfactory results. No summer frosts had occurred and as the soil is good, potatoes, carrots, onions, cabbage, &c., had done well.

From Sturgeon lake I proceeded to West Prairie river, where I was informed that owing to the low water in Lesser Slave lake, the ferry connecting its west shore with Stony Point had stopped running, and that it would also be unsafe to attempt this passage with loaded wagons on account of the springy and treacherous bottom of the lake at that place. So I turned north, intending to reach Stony Point by the Peace river road; this gave me a chance to examine carefully this section of partly open and level country which is now being settled. The great fertility of the soil was amply shown by the thick growth of wild grasses and peavines. On this road we passed many farms where good crops of oats, potatoes, &c., had been raised. Hay also can be cut around here in unlimited quantity, and consequently the settlers keep many cattle. North of South Heart river the country remains partly open, but as it gradually rises towards the north its soil might possibly be lighter than in the bottom lands over which we had travelled since leaving West Prairie river. In driving around the north

6-7 EDWARD VII., A. 1907

end of the lake we passed by the English mission, who have well cultivated lands and who own the sawmill near South Heart river. Further we came to a large farm, the property of the Roman Catholic mission, who have erected thereon many substantial buildings, and have a large part of this farm under cultivation.

At Lesser Slave lake are the Hudson's Bay Company's trading post and the Roman Catholic mission, surrounded by the village, all built on a high bench overlooking the lake, and from which one gets a magnificent view of the settlements around the lake and of the western country. At the foot of this bench and close to the lake shore the mission has a fine sawmill and grist mill combined. Last summer they also built here a small steamer, which will go to improve the transportation of goods through the district.

On arriving at Stony Point I heard from Messrs. Bredin and Cornwall that one of their boats, due to arrive in a few days, would, as soon as unloaded, return to the mouth of Lesser Slave river, and if circumstances permitted sail down the Athabaska river as far as the Landing. So preparations were made to leave at an early date, and by October 9 we were on our way.

The stage of water was the lowest noticed for years, and the barge frequently ran aground on the many bars. Over this part of the river a steamer had, however, in the spring made a few trips between Athabaska Landing and the mouth of Lesser Slave river, and could even have ascended this stream twelve or fifteen miles further to the foot of some bad rapids which obstruct the navigation for a few miles. It is now proposed by interested parties at the lake to run another steamer between Stony Point and the heads of these rapids, in connection with the steamer running between Athabaska Landing and Slave river; the transshipment of goods over the few miles of rough water to be done with barges manned by natives, who will be stationed there with their families for the season. On October 16 we arrived at Athabaska Landing, and a few days later reached Edmonton, where the party was paid off. I then left for Ottawa, where I arrived on October 30.

From the foregoing detailed description of the country to the west and southwest of Lesser Slave lake as far as my surveys and explorations went, it will be seen that it is well watered and that the soil is generally of good quality, with the exception of a small strip adjoining the 17th base line and extending in a southwest by west direction across townships 64, ranges 26 and 27, west of the fifth meridian. This section is composed of pine ridges fifty to sixty feet high, where the soil is sandy or gravelly. In other parts of the country where the primitive forest has been destroyed by repeated fires the surface soil has disappeared to some extent. Here we find that poplar bush and willow predominate. On Hunter's and Sturgeon mountains grows some large timber, spruce and pine. But for many years yet the timber required for the needs of the settlers will be drawn from the vicinity of the two Prairie rivers and South Heart river, whose courses can be utilized for driving the logs to the sawmills.

When I came to Lesser Slave lake, access to the western country could only be had by a circuitous bridle path or pack trail. This inconvenience has to a large extent been removed since I made a wagon road between Lesser Slave and Sturgeon lakes. The deep creeks crossing this road have been bridged, and the approaches to the rivers have been graded, so that there are at present no serious impediments to heavy traffic between the two places. In the winter season, even 'Grande prairie' might be reached now by following the sled road opened west of Sturgeon lake by Mr. J. K. Cornwall in the fall of 1904.

Regarding the climatic conditions and their influence on agriculture, I will say that in dry seasons, as was the case in 1904, summer frosts will occur, but if it is wet all the crops will generally come to maturity. The culture of wheat has not yet been attempted here, as far as I know, but I am informed that at Vermilion settlement, on Peace river, 200 miles north of Lesser Slave lake, fall wheat is successfully grown. It is turned into flour at the grist mill of the settlement, and goes to supply the needs of the northern country.

SESSIONAL PAPER No. 25b

There is undoubtedly much coal underlying the surface of this district, as indicated by the drift coal deposited along the river banks. Even the beds of small creeks were found literally filled with coal. The great size of the lumps of coal found on the Moose and Simonette rivers, where they intersect the sixth meridian, would indicate that the seams from which they had been detached were not very far off. This coal is certainly of a better quality than the ordinary lignite, and a systematic search would likely lead to the discovery of valuable seams of this mineral.

Sandstone was noticed at many places, notably at the crossing of the Simonette near the corner of township 61, on the sixth meridian, and at two places in township 64, range 23, west of the fifth, i.e., at the crossing of Waskahigan river and on a hill at the northeast corner of this township.

Many land explorers and ranchers have lately visited this district in search of land suitable for ranches. Some parties have even gone as far as 'Grande prairie' in their explorations. Up to a few years ago the fur trade was the chief inducement offered to the few white people who made their residence in this wooded country, inhabited by a few families of roaming Indians, reinforced by half-breeds who had emigrated here from Lake St. Ann and other settlements to the southeast. But now settlers are making their way into this district and have begun to till the land.

Large game still abounds west of Simonette river and south of Snipe lake. Beavers were found in great numbers on all streams south of the 17th base line, a country which has been so far inaccessible to the natives. But it is likely that these interesting animals will soon be greatly reduced in numbers or scattered by the trappers who will now travel thither over the roads which we had to cut through the forest to do our surveys. Small game such as duck, geese, partridge, &c., is scarce; the lakes however, are full of white and jackfish, of the former great quantities are caught by the Indians of Sucker Creek reserve; and are used as dog food on their winter trips.

The transportation of goods into the district has been, so far, a serious problem as everything had to be brought in barges manned by native boatmen. With the advent of steam navigation, the cost of goods will be greatly reduced and vexatious delays avoided.

The whole respectfully submitted,

I have the honour to be, sir,

Your obedient servant,

(Sgd.) ARTHUR SAINT CYR.

6-7 EDWARD VII., A. 1907

APPENDIX No. 34 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF ARTHUR SAINT CYR, D.L.S.

SURVEY OF EIGHTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

SNIPE LAKE, May 15, 1906.

E. DEVILLE, Esq., LL.D.
Surveyor General,
Ottawa.

SIR,—I have the honour to submit an interim report of the work done up to date, and a description of the country south of Snipe lake and in the vicinity of ranges 20, 21, and 22, township 68, west of the fifth meridian. This section of country is reached by a pack trail which branches off from the Lesser Slave lake and Sturgeon lake winter road at about one-third of a mile west of Snipe lake and runs southerly to the eighteenth base line which it crosses near the northeast corner of section 31, township 68, range 19. West of Snipe lake the ground which is nearly level is covered with a second growth of poplar with alder and willow brush. The forest begins near the south end of the lake and extends southerly. It is made up of poplar six inches to thirteen inches, spruce eight inches, balsam fir, birch four inches to six inches.

Between Snipe lake and the base line, a distance of twelve miles, the country is rolling. The soil is good; being a black loam four inches to six inches deep over a clay subsoil.

Numerous small streams, all flowing northwesterly are crossed, the principal one being Carrot creek, which is met at about four miles north of the line. It flows in a northwesterly direction between high banks and empties into Little Smoky river.

I began the survey of the 18th base line at the northeast corner of township 68, range 20, west of the fifth meridian. In this range the land is undulating and covered with poplar six to fifteen inches in diameter, spruce six to twelve inches, birch four to eight inches, large cottonwood and balsam fir with heavy underbrush. The soil is a black loam over a clay subsoil. Many tributaries of Carrot creek drain this part of the country. In range 21, the line crosses Goose river, once in the middle of section 34 and twice near the northeast corner of section 33. This stream flows into Little Smoky river, which it joins two miles north of the point where the base line intersects the first mentioned river. Goose river is two chains wide with banks ten feet to forty feet high. Its bottom is stony with a swift current. This stream is not navigable. Seams of coal were seen along its banks. The east half of range 21 is wooded with poplar, spruce and birch. Soil same as in preceding range. The west half is swampy and wooded with small spruce. Little Smoky river is crossed twice: first in the middle of section 31, and again at the northeast corner of township 68, range 22. It is three chains wide, with a depth of water of three feet at the time of survey. It has a sandy bottom here, and banks thirty feet high; its valley is about half a mile wide. There are some flats of good, partly open land along this stream.

In range 22, Little Smoky river is crossed for the last time in the middle of section 36. From that point westerly to the northeast corner of township 68, range 23, the ground is undulating and covered with young poplar, and scrub willow in sections 34 and 35. In section 33 the forest begins; it extends to the western limit of this range. Soil is good.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) A. SAINT CYR.

SESSIONAL PAPER No. 25b

APPENDIX No. 35 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF B. J. SAUNDERS, D.L.S.

SURVEY OF THE FIFTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

EDMONTON, ALTA., September 28, 1905.

F. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on the survey of the fifteenth base line, west of the fifth meridian, made in accordance with your instructions, dated October 28, 1904, and received by myself on the 5th of the following month.

Upon receipt of your instructions, I immediately set about completing the work then in hand with all possible speed, and, at such times as I could, arrange for the coming survey by engaging men, preparing my transport, getting supplies ordered and attending to the many other matters incident to a winter survey. By November 28 we were ready to start out from Edmonton, but owing to there being neither wheeling nor sleighing I decided to hold my party in until more snow fell, there being indications of a storm. Snow having come in the course of a few days, we made a start on December 6, and on the second day following our first camp was made about one mile south of the fifteenth base near the centre of range 1, west of the fifth meridian, on what is locally known as the Chalmers trail.

The reopening and retracement of the line through range 1 was immediately proceeded with, but two or three days delay occurred in waiting for an observation for azimuth on account of cloudy weather. After this slight delay fair progress was made and the line was reopened and very carefully retraced through the first eight ranges. The results obtained have already been communicated to you in my former interim reports. Range 9 was reached on January 27 of this year, and from that time forward no efforts were spared to prosecute the work as vigorously as possible considering the nature of the country traversed by the line and the difficulty in making roads and keeping up supplies. On May 2 my packer, having returned with supplies from Lake St. Ann, reported that it would be impossible to bring in anything further by the trail we had made along the line from a short distance west of Macleod river to range 20, owing to the frost coming out and the amount of fallen timber lying in the trail. In addition there was practically no feed for horses right from Lake St. Ann to where we were then situated, fires having been set out by careless people, and as a result nearly every patch of grass where a horse might obtain some slight nourishment was destroyed.

Under these conditions I, after duly considering everything, very reluctantly decided to abandon the work at the point we had then reached, namely, two miles in range 20, west of the fifth meridian. What supplies and equipment we did not need for the return trip were cached, and on May 6 a start was made for Lake St. Ann, which was reached on May 18. A few days later all my party had arrived in Edmonton, and were paid off.

Regarding the country traversed by this base line through the first eight ranges I shall not say anything, it having doubtless been reported on before by the surveyors who made the first survey. Throughout ranges 9, 10 and 11 the country rises gradually as you go west, the summit being reached in the westerly part of range 11, where the watershed between Paddle and Macleod rivers lies. In addition the country is generally rolling, with higher land on either side of the line to the north and to the south. It has been burned over repeatedly, and has a generally open appearance. The soil is of fair quality, and this section will no doubt in due course be settled upon. Through range 12 and the east half of range 13 the slope is westerly, falling toward Macleod river, which is crossed in the middle of range 13. The land and physical features are similar to those met with in the previously mentioned ranges.

6-7 EDWARD VII., A. 1907

The west half of range 13, range 14 and the east half of range 15 are in fairly open country, covered with small poplars and willow chiefly, and the soil seems to be of good productive quality. There is a gradual rise to the west, with a prominent tableland known as the 'Shining-bank hills' lying some two or three miles to the north of the line and running parallel with the line. These hills terminate in the west side of range 15 in what is termed 'Shining-bank,' so called from its shining appearance at certain times of the day when the sun is shining.

From this point the country becomes more hilly and broken, and covered with heavy fallen timber almost throughout, right up to the end of the work in range 20, with every indication of its extending much farther to the west. At one time there must have been a very fine spruce forest covering all this section of the country, as many of the dead tree trunks have a diameter of from two and one-half to three feet, and occasionally some of four feet diameter were noticed. In this fallen timber section of the line there is the customary growth of pitch pine and small spruce, with some poplar. The latter, however, practically disappears in range 17.

A prominent hill known as 'The sixth hill' was crossed by the line in range 18. Its summit has an elevation of about 4,200 feet above sea level, and is some 700 feet above the surrounding country. It is a very prominent landmark, and can be seen from the east side of range 12, from which also the first view of the mountains is obtained on this base line. 'The sixth hill' and adjacent land forms the divide between Macleod and Athabaska rivers. The soil in these westerly ranges is of poor quality, and exceedingly stony. It may be worth while noting that on the westerly slope of 'The sixth hill' a few hemlock trees were seen.

The only prominent body of water adjoining this line is a lake known as 'Shining-bank lake' lying to the south of the line in range 14. It is from three to four miles in length with an average width of about three-quarters of a mile. It is said to abound with whitefish of very large size, but I am not able or prepared to verify this statement.

The greatest depth of snow we had during the winter was about eighteen inches and unfortunately for the work, it went away too soon, necessitating our abandoning the use of sleighs at the first of March and resorting to pack horses from that time forward to bring in our supplies from Lake St. Ann.

On the whole the weather was very favourable, only two or three cold dips having been experienced and they were of short duration.

Should the completion of this line be undertaken in the near future, I would recommend that the attempt be made to take in supplies by Jocks trail to Athabaska river and float them down to the line, or that the attempt be made to find a favourable route for a trail from Jocks trail into the end of the line in range 20, rather than to take in supplies by the route used by myself along the line. I had three men explore the country to the south, and their report was to the effect that a better trail could be got in this latter way than the one we were compelled to use along the line.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) B. J. SAUNDERS, *D.L.S.*

SESSIONAL PAPER No. 25b

APPENDIX No. 36 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF HENRY W. SELBY, D.L.S.

SURVEYS IN THE PEACE RIVER DISTRICT.

TORONTO, February 12, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my field operations during the past season.

In conformity with your instructions dated January 12, to make a survey of the Shaftsbury settlement on Peace river, and those dated February 25, to continue the fifth meridian from the 19th to the 20th base line and to establish the 20th base line between the fifth and sixth meridian, I left Ottawa on March 8, and at Edmonton engaged six men to assist me in the settlement survey, near where I had stored my outfit of the previous season. On the completion of the above survey, I returned to Moose river and began the survey of the fifth meridian from the 19th to the 20th base line and the 20th base line to the 6th meridian, which was completed on November 8.

On November 15, I returned to Lesser Slave lake, sold the outfit by public tender and with a York boat reached Athabaska Landing on November 23, and Edmonton November 27, where the party was disbanded.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 44.)

The water through the region traversed was generally good, clear and pleasant to the taste. The land as seen from the line across the first 13 ranges is at present unfit for agriculture, but the next 11 ranges will be generally good for farming purposes. My operations during the season covered a large amount of travelling and without a general knowledge of the country would have consumed a great deal more time than it did. Besides making the survey of Shaftsbury settlement, I surveyed 180 miles of base line and meridian from May 25 to November 8 through heavy timber and a difficult country.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) HENRY W. SELBY.

6-7 EDWARD VII., A. 1907

APPENDIX No. 36

WEATHER STATISTICS—5TH MERIDIAN—ALBER TA

Month.	Day.	Place.			Temperature.			Barometer.	Min. Temp.	Direction of wind.	Days Rain.	Days Snow.
1905.		Sec.	Tp.	Rge.	7 am.	2 pm.	9 p.m.	"				
May.....	25	1	73	1	40	61	47	.....	30°	N. E.		
".....	26	1	73	1	45	..	39	.....	29	"		
".....	27	1	73	1	44	66	42	.....	30	"		
".....	28	Moon Lake.....			49	65	47	.....	32	"		
".....	29	.....			46	..	48	.....	34	S. W.		
".....	30	.....			55	..	58	.....	37	"		
".....	31	.....			53	88	62	.....	45	N. W.		
June.....	1	.....			56	85	57	.....	43	S. E.		
".....	2	.....			65	..	67	.....	45	W. & N. E.		
".....	3	.....			56	70	65	.....	43	S. E.		
".....	4	.....			64	81	58	.....	42	N. W.		
".....	5	.....			63	78	57	.....	38	"		
".....	6	.....			56	..	49	.....	50	S.		
".....	7	.....			52	78	58	.....	40	W.		
".....	8	.....			42	..	48	.....	36	N. W.		
".....	9	.....			47	75	41	.....	31	S. W.		
".....	10	.....			55	80	58	.....	38	W.		
".....	11	.....			54	66	45	.....	50	W.	1	
".....	12	.....			48	69	46	.....	35	N. W.		
".....	13	.....			50	69	46	.....	30	N.		
".....	14	.....			62	64	40	27.59	30	N. W.		
".....	15	.....			72	54	48	27.78	30	N. E.		
".....	16	.....			46	63	44	26.97	42	"	1	
".....	17	.....			37	64	44	27.02	30	S. E.		
".....	18	.....			48	60	50	26.54	38	S. W.		
".....	19	.....			54	59	52	26.52	42	S.		
".....	20	.....			51	71	45	26.72	43	W.		
".....	21	.....			56	58	46	26.62	45	N. W.		
".....	22	.....			34	48	38	26.85	28	"		
".....	23	.....			34	46	35	26.84	32	E.	1	
".....	24	.....			39	52	46	26.89	31	E.		
".....	25	.....			56	62	48	27.13	25	E.		
".....	26	.....			41	..	48	26.95	33	W.		
".....	27	.....			49	58	49	26.46	44	W.		
".....	28	.....			52	68	51	26.54	44	N. W.		
".....	29	.....			52	69	47	26.64	48	W.		
".....	30	.....			49	70	55	26.95	37	W.		
July.....	1	31	76	1	47	70	60	26.96	38	N. W.		
".....	2	34	76	1	68	76	62	26.71	45	"		
".....	3	34	76	1	55	71	56	26.71	48	S. W.		
".....	4	32	76	2	57	59	45	26.62	48	N. E.		
".....	5	32	76	2	52	62	54	26.80	49	S. W.	1	
".....	6	36	76	3	50	72	58	26.68	47	"		
".....	7	36	76	3	52	68	45	26.78	46	"		
".....	8	32	76	3	55	70	56	27.05	34	W.		
".....	9	32	76	3	56	..	48	26.72	46	W.		
".....	10	32	76	3	45	67	49	26.62	42	S. W.		
".....	11	34	76	4	52	66	50	26.66	48	N. W.		
".....	12	32	76	4	58	74	51	26.74	40	S.		
".....	13	32	76	4	58	74	54	26.80	35	O.		
".....	14	35	76	5	53	..	49	26.57	50	N. E.	1	
".....	15	35	76	5	50	69	45	26.87	49	W.		
".....	16	35	76	5	52	74	48	26.84	37	S. W.		
".....	17	35	76	5	54	68	52	26.65	36	N. W.		
".....	18	35	76	5	54	67	56	26.85	42	W.		
".....	19	31	76	5	50	76	52	27.13	41	N. W.		
".....	20	31	76	5	50	78	..	27.16	44	O.		
".....	21	31	76	5	57	79	61	27.09	49	S. E.		
".....	22	31	76	6	62	86	59	27.01	54	S. E.		
".....	23	31	76	6	79	78	54	26.94	50	S. W.		
".....	24	31	76	6	60	70	55	27.06	42	S. E.		
".....	25	33	76	7	62	74	56	27.02	41	S.		
".....	26	31	76	7	62	77	60	27.04	42	S.-N. E.		
".....	27	31	76	7	62	77	60	27.04	42	"		
".....	28	31	76	7	59	80	60	26.84	46	S. W.		
".....	29	31	76	7	52	59	48	27.16	42	"		
".....	30	31	76	7	56	62	49	27.02	38	S. E.		
".....	31	31	76	7	57	..	56	27.07	41	O.		
August.....	1	31	76	7	56	74	56	27.06	46	N. E.		
".....	2	31	76	7	52	74	59	26.93	38	S.		
".....	3	31	76	7	50	76	46	26.81	41	S.		
".....	4	34	76	8	56	77	44	26.82	41	W.		
".....	5	34	76	8	46	76	58	26.93	31	W.		
".....	6	31	76	8	62	89	61	26.92	46	S. E.		
".....	7	31	76	8	58	73	55	26.89	54	W.		

SESSIONAL PAPER No. 25b

—Continued.

HENRY W. SELBY, DOMINION LAND SURVEYOR.

Days Fair.	Days completely clouded.	Aurora.	Thunder storms.	Fogs.	Hours Sunshine.	Humidity.	Remarks.
1					11		
1					14		Smoky.
1					12		"
1					10		"
1					10		"
1					11	70	" (Very thick.)
1					9	75	"
1					8	58	"
1			6 p.m.—1		13	52	"
1					6	77	"
1					12	94	"
1					7	38	" (Rained in evening.
1					10	94	
1			2 p.m.—1		6	75	Rained two hours in evening.
1					10	100	
1					14	60	
1					14	55	Smoky.
1					4	70	
1					8	73	Showers at noon.
1					12	85	Showers in evening.
1					14	79	
1					9	74	Showers at noon and p.m.
1					6	85	Fair in p.m..
1					10	100	
1					14	93	
1					12	87	
1					10	73	Showers at noon.
1					6	88	Showery all day.
1					4	62	A few flakes snow.
1					2	100	Snow and sleet, a.m.
1					8	91	Showery in a.m.
1					12	59	Showers at noon.
1					7	93	Showery all day.
1					6	86	Rained all a.m.
1			5 p.m.—1		10	87	Thunder and hail, 4-5 p.m.
1					15	73	
1					12	63	
1			2 p.m.—1		10	100	
1					13	53	
1					14	76	
1					8	77	Showery all a.m.
1					2	94	Thunder storm, 2-4 p.m.
1					10	100	
1					14	100	
1					8	55	Showery at night.
1					6	71	Showery.
1					9	100	"
1					8	100	"
1					15	77	
1					10	76	
1	1				0	88	Rainy all day.
1					13	100	Showers at 7 a.m. and 6 p.m.
1			1		8	88	
1				1 a.m.	8	94	
1					10	88	Showers at night.
1					15	100	
1					15	87	
1			1		14	57	Showers at night.
1					12	84	
1			1		8	72	Showers in evening.
1			2 p.m.—1		6	94	
1			1		5	89	Showers all evening.
1			7 p.m.—1	a.m.—1	8	94	
1					14	100	
1					10	94	
1					10	79	
1					3	82	
1					6	88	
1					8	88	Showers at 2 p.m.
1					5	88	
1					8	93	
1					9	100	Showers at 2 p.m.
1					10	93	Showers in evening.
1					9	89	
1					8	82	

6-7 EDWARD VII., A. 1907

APPENDIX No. 36

WEATHER STATISTICS—5TH MERIDIAN—ALBERTA

Month.	Day.	Place.			Temperature.			Barometer.	Min. Temp.	Direction of wind.	Days Rain.	Days Snow.
		Sec.	Tp.	Rge.	7 am.	2 pm.	9 p.m.	"				
1905.												
August.	8	31	76	8	52	76	61	26.89	43	W.		
"	9	31	76	8	56	78	59	26.73	54	W.		
"	10	35	76	9	57	70	48	27.01	38	S. E.		
"	11	35	76	9	34	72	66	27.13	32	S. W.		
"	12	35	76	9	56	70	57	26.90	50	O.		
"	13	35	76	9	58	71	62	26.84	52	S. W.		
"	14	35	76	9	44	56	45	26.70	39	"		
"	15	35	76	9	37	62	48	26.76	34	"		
"	16	35	76	9	48	61	46	26.62	46	"	1	
"	17	35	76	9	48	67	48	26.65	46	W.		
"	18	35	76	10	49	68	52	26.53	43	W.		
"	19	35	76	10	50	69	52	26.43	46	S. W.		
"	20	33	76	10	50	67	46	26.62	44	N. W.		
"	21	33	76	10	50	62	48	26.59	41	S. W.		
"	22	33	76	10	45	60	51	27.01	33	N. W.		
"	23	36	76	11	40	62	54	27.03	32	S. W.		
"	24	36	76	11	48	60	56	26.99	44	S. W. & S. E.		
"	25	32	76	11	46	66	48	26.91	46	S. W.		
"	26	32	76	11	36	67	44	26.82	33	"		
"	27	32	76	11	54	68	46	26.89	30	W.		
"	28	32	76	11	36	70	55	26.86	30	N. W.		
"	29	34	76	12	48	62	54	26.94	47	S. E.		
"	30	34	76	12	48	60	54	26.86	47	"		
"	31	34	76	12	50	59	54	26.78	50	E.		
Sept'er.	1	34	76	12	46	66	57	27.06	45	S. E.		
"	2	36	76	13	54	72	56	27.07	41	S.		
"	3	36	76	13	34	66	51	26.87	45	S.		
"	4	36	76	13	45	68	51	27.08	32	S. W.		
"	5	34	76	13	48	60	44	27.00	46	W.		
"	6	34	76	13	44	56	29	27.09	37	N. W.		
"	7	31	76	13	32	58	32	27.27	24	W.		
"	8	35	76	14	28	62	32	27.26	21	S.		
"	9	35	76	14	38	56	45	27.13	21	S. W.		
"	10	35	76	14	54	43	33	27.03	26	N. W.		
"	11	35	76	14	28	50	34	27.45	20	W.		
"	12	36	76	15	30	60	48	27.12	28	S. W.		
"	13	36	76	15	38	68	50	26.84	36	W.		
"	14	36	76	15	39	60	47	26.87	39	N. W.		
"	15	31	76	15	37	59	43	27.17	37	W.		
"	16	35	76	16	36	58	46	26.52	36	S. W.		
"	17	35	76	16	45	52	42	26.43	39	W.		
"	18	35	76	16	38	58	52	26.50	35	S. W.		
"	19	33	76	16	50	60	50	26.34	48	N. W.		
"	20	33	76	16	44	60	47	26.38	38	"		
"	21	34	76	17	48	52	32	26.70	36	"		
"	22	34	76	17	32	64	38	27.04	24	E. to W.		
"	23	34	76	17	20	52	44	27.31	18	S. E.		
"	24	31	76	17	48	50	46	26.96	41	"	1	
"	25	31	76	17	30	54	40	26.88	29	W.		
"	26	Heart River.....			30	52	38	26.75	25	W.		
"	27	35	76	18	30	60	44	26.86	27	O.		
"	28	35	76	18	36	54	30	26.84	36	N. W.		
"	29	35	76	19	29	58	38	27.04	24	N. W.		
"	30	35	76	19	30	46	32	26.92	28	N.W. to S.W.		
October.	1	32	76	19	40	62	24	27.13	26	W.		
"	2	32	76	19	30	54	38	26.94	20	W.		
"	3	32	76	19	38	53	43	26.77	24	W.		
"	4	32	76	19	35	54	28	27.13	30	N. W.		
"	5	34	76	20	35	42	38	27.00	24	N. E.	1	
"	6	34	76	20	37	41	38	26.85	36	O.		
"	7	34	76	20	38	40	37	26.92	34	O.	1	
"	8	34	76	20	36	44	37	27.13	30	W.		
"	9	34	76	20	32	39	28	27.51	32	N. W.		
"	10	34	76	20	27	59	47	27.45	24	"		
"	11	34	76	21	52	58	38	27.08	46	W.		
"	12	34	76	21	34	41	26	27.17	30	N. W.	1	
"	13	34	76	21	20	42	38	27.55	20	N.		
"	14	34	76	21	18	54	16	27.47	18	S. E.		
"	15	34	76	21	34	42	16	27.77	13	N.		
"	16	34	76	21	26	28	13	27.47	14	N.		1
"	17	34	76	21	0	13	4	27.95	3	N. W.		
"	18	34	76	21	1	24	6	27.72	14	N. E.		
"	19	34	76	21	4	44	38	27.61	2	S. W.		
"	20	34	76	21	32	46	32	27.71	32	N. W.		
"	21	34	76	21	27	50	36	27.48	25	"		
"	22	34	76	21	35	44	36	27.92	31	N. E.		
"	23	34	76	21	32	40	34	27.88	30	O.		
"	24	34	76	21	30	36	32	27.83	26	N. E.		1
"	25	34	76	21	28	28	20	28.06	18	O.		

SESSIONAL PAPER No. 25b

—Continued.

HENRY W. SELBY, DOMINION LAND SURVEYOR.

Days Fair.	Days completely clouded.	Aurora.	Thunder storms.	Fogs.	Hours Sunshine.	Humidity.	Remarks.
1					10	75	
1					8	82	
1					6	83	Showers in evening.
1			p.m.—1		8	74	Storm at night.
1				1	3	83	Shower at 2 p.m.
1			p.m.—1		7	94	
1				1	3	79	Showery in evening.
1					6	91	Showers at 2 p.m.
1					3	93	Raining all day.
1					5	93	Showers at 2 p.m.
1					5	73	Showers at 5 p.m.
1			4 p.m.—1		7	87	
1					9	100	
1					3	80	Showery.
1					6	100	
1				1	10	92	Shower at 4 p.m.
1			noon—1		4	93	Showery.
1				1	9	93	
1					12	91	
1					11	88	
1					10	82	
1				1	4	93	Showery in evening.
1	1					100	Shower, 4 p.m. and evening.
1	1					100	
1				1	10	100	
1					9	100	
1					10	76	
1					6	91	Smoky and at night raining.
1				1	2	93	
1					7	100	Showers in evening.
1					9	100	" "
1					11	52	
1					10	73	
1					6	58	
1					9	78	
1					10	100	
1					11	84	
1					6	84	Showery in evening.
1					9	91	
1					6	91	Showery all night.
1					7	93	P.M. showery.
1					6	100	A.M. showery.
1	1					62	P.M. showery.
1					10	69	
1					7	59	
1					4	79	P.M. showery.
1					9		
1	1					65	P.M. showery.
1					9	89	
1					6	78	A.M. showery.
1					10	89	
1					2	73	Mist.
1					9	78	
1	1					100	P.M. showery.
1					10	75	
1					9	89	Rain all night.
1					6	83	
1					8	62	
1	1					62	Rain all day.
1	1					100	
1	1			1		91	
1				1	1	100	
1					5	89	
1					8	78	
1					6	67	Shower in evening.
1					1		Drizzle all day.
1					9		
1	1						
1	1						First snowfall.
1					7		
1					8		
1					5		
1					6		
1					4		
1					5		
1					4		
1	1			1			Snow in evening.
1					1		

6-7 EDWARD VII., A. 1907

APPENDIX No. 36

WEATHER STATISTICS—5TH MERIDIAN—ALBERTA,

Month.	Day.	Place.			Temperature.			Barometer.	Min. Temp.	Direction of wind.	Days Rain.	Days Snow.
1905.		Sec.	Tp.	Rge.	7 am.	2 pm.	9 p.m.	"				
October..	26	34	76	21	22	24	18	28.37	8	N.		1
"	27	34	76	21	8	22	16	28.56	15	O.		
"	28	34	76	21	16	23	14	28.50	5	S. W.		
"	29	34	76	21	6	27	16	28.48	16	O.		
"	30	34	76	21	16	32	30	28.20	24	N. W.		
"	31	34	76	21	24	38	36	28.08	34	S. W.		
Nov'ber.	1	31	76	24	37	38	40	27.01	22	W.		
"	2	31	76	24	23	43	42	27.31	28	W.		
"	3	31	76	24	32	41	36	26.83	28	N. W.	1	
"	4	33	76	25	32	45	38	27.47	26	O.		
"	5	33	76	25	36	44	41	27.41	32	S. W.		
"	6	33	76	25	33	56	50	27.53	47	"		
"	7	36	76	26	52	60	43	27.25	33	W.		
"	8	36	76	26	34	54	37	27.54	26	W.		
"	9	36	76	25	29	40	36	27.29	24	O.		
"	10	33	76	23	22	43	28	27.41	22	O.		
"	11	31	76	21	22	48	43	27.49	40	S. W.		
"	12	32	76	19	50	54	41	27.16	37	W.		
"	13	Lake		19	40	53	49	27.22	38	S. E.		
"	14	Heart River.....			39	40	36	27.13	34	S. W.	1	
"	15	Slave Lake Post....			34	..	..	27.02		S. E.		

SESSIONAL PAPER No. 25b

—Continued.

HENRY W. SELBY, DOMINION LANDS SURVEYOR.

Days Fair.	Days completely clouded.	Aurora.	Thunder storms.	Fogs.	Hours Sunshine.	Humidity.	Remarks.
.....	1	.....	.....	.....	.....	.....	.....
1	3	.....	.....
1	1	6	.....	.....
1	8	.....	.....
1	3	.....	.....
1	2	.....	.....
1	3	.....	.....
1	4	.....	Rain at night.
.....	3	.....	Rain in afternoon.
1	8	.....	.....
1	7	.....	.....
1	4	.....	Shower in a.m.
1	6	.....	.....
1	8	.....	.....
1	9	.....	.....
1	3	.....	.....
1	4	.....	Shower in evening.
1	6	.....	.....
1	4	.....	.....
.....	5	.....	Showery all day.
1	6	.....	.....

6-7 EDWARD VII., A. 1907

APPENDIX No. 37 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF J. N. WALLACE, D.L.S.

SURVEY OF THE EIGHTEENTH BASE LINE, WEST OF THE FIFTH MERIDIAN.

CALGARY, ALTA., February 3, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of the survey of the eighteenth base line west of the fifth meridian, undertaken in accordance with your instructions of March 1, 1905.

As the season was likely to open very early, and as, unlike most surveyors in the district, I could get the horses to my starting point without having to take them on the ice, I decided that nothing would be gained by commencing operations before the spring opened, although it was necessary to get as much freight as possible sent up the Athabaska river before the ice broke up.

I therefore at once sent about seven tons of supplies, hay and oats, up the Athabaska river on the ice to a point about eighty-five miles above the Landing, where it was estimated the base line would cross the river. This proved a difficult and dangerous operation, as when the freighters started from the Landing on March 2 the ice was already beginning to break up, the water was running over the surface in many places, and there was risk of losing the whole load. However this task, as well as many similar ones during the season, was very satisfactorily carried out under the charge of Mr. James Bisset, one of my survey party. The freight being left within a mile of the crossing of the base line, I was saved a great deal of trouble and delay, which would have been unavoidable had I been dependent on getting this freight up by boats, or on carrying it across country on pack horses. Unfortunately the ice was in such a dangerous condition that there was no time to divide the load and make a cache on each side of the river, which would have saved the trouble of subsequently having to ferry nearly all of it across the river.

On April 10, I left Calgary to commence field operations, and reached Edmonton the same day. On the 18th the party left Edmonton with my assistant, Mr. W. T. Green, and reached Athabaska Landing on the 21st, I having been delayed a few days at Edmonton waiting for my transit.

On April 28 we left the Landing; the horses and greater number of the party, including myself, travelling across country some forty miles northeast to the cache of supplies on the river, while five of them went up the Athabaska, tracking a small boat to be used in getting the heavy load of freight across the river at the cache.

We reached the cache on May 4, and had the bulk of the freight ferried across and placed in a new cache on the west side by May 8.

Next day we moved back some seven miles easterly to the fifth meridian, where I was to commence work. At the township corner it was found that while the old wooden post (planted in former surveys beside the iron post at township corners), and also the two bearing trees indicated the corner in one place, the old iron post was standing on the meridian fourteen chains and thirty-eight links further south. I therefore opened out the fifth meridian for a mile north and a mile south of the township corner, and found that the remains of the quarter-section and section corners both north and south, and their bearing trees all correspond with the position of the old wooden post, and not with that of the iron post. Here was a very serious source of error. It is very extraordinary that whoever removed the iron post should have

SESSIONAL PAPER No. 25b

gone to the trouble of carrying it so far down the meridian and then planting it again.

From May 9 to December 4 the line was continually run until, at the latter date, the difficulties in regard to feed for the horses, which had been very serious all season, became too great, and work was stopped at the end of range 19, after running one hundred and fourteen miles, nearly all of it in a difficult country, and about thirty-five miles in as rough a country as I believe a base line has ever been run, excepting in the neighbourhood of the Rockies.

We reached Prairie River settlement, near the west end of Lesser Slave lake, on December 9, where I left twelve of the best pack horses to be wintered with Mr. Oliver Hill, and the pack outfit with Bredin and Cornwall. On December 16 we left the west end of Lesser Slave lake, reached Athabaska Landing on December 23, and Edmonton on December 28, where the party was paid off, and I came down to Calgary on January 2.

Eighteenth base line.—From the fifth meridian to a crossing of Athabaska river, the base line runs through a rolling country covered irregularly with spruce and jackpine, with a few local areas of poplar, the timber being nearly all small, but growing thickly.

West of the Athabaska, the first six miles are through a rolling country, covered with jackpine, spruce and poplar, with local swamp land. For about a mile east and three miles west of the crossing of Sauleux river the lands are very swampy.

The country begins to rise at the end of the first mile in range 4, and, while there are a few local descents, the elevation of the whole rises steadily for twenty-six miles to the summit of Deer mountain, where the line reaches an elevation of over three thousand seven hundred feet above sea level, being a total rise from Athabaska river of nineteen hundred feet. The lands along this slope are all densely timbered. For some nine miles, across range 4 and to the centre of range 5, the timber is generally a heavy growth of poplar, running to fourteen and eighteen inches, with small areas of jackpine and spruce. From the centre of range 5 to the west end of range 13, a distance of over fifty miles, the timber is fully eighty per cent jackpine, and of the remainder much the greater portion is spruce, poplar only occurring in small isolated patches.

From the summit of Deer mountain, which occurs at the centre of range 8, the land falls about twelve hundred feet in six miles to Swan river. West of this river it again rises steadily to an elevation of about thirty-three hundred feet near the centre of range 10. From here for six miles to the centre of range 11, the whole country is cut up by hills, valleys and ravines.

Further west the country is a succession of small mountains, the highest point reached on the line being near the west end of range 12, where the elevation is about four thousand two hundred feet. From this last summit the line falls some fifteen hundred feet in eight miles to the crossing of East Prairie river, the intervening area being composed of hills and valleys.

East Prairie river forms about the westerly end of the very rough country, but the line for some thirty miles further west to the end of range 18 is still in a hilly country. West of range 18 the land falls to Little Smoky river, the end of the line being at an elevation of about twenty-five hundred feet, and the country falling steadily further west.

The area of hills and mountains extends from the east end of range 4 to the west end of range 17, the roughest part being along ranges 7 to 13, and probably extending for a distance of about fifteen miles to the north and south of the base line.

This latter rough area is unsuitable for settlement. The country is too broken and the soil too poor, being largely composed of sand and boulders. A remarkable characteristic is the almost total absence of grass, the entire surface for mile after mile being covered with moss. The cause of this must be the high elevation. There is abundance of good grass everywhere in the country around Lesser Slave lake at an elevation of about fourteen hundred feet below the average elevation of these hills.

6-7 EDWARD VII., A. 1907

The rivers crossing this area have all the characteristics of mountain streams. Their current is very rapid, their bed formed of gravel and boulders, and the water is beautifully clear. All the larger streams flow in sloping valleys, five hundred to eight hundred feet deep, but there is no level or agricultural land along their course. The hills and mosses descend almost to the water's edge.

This rough area, while being quite unsuitable for settlement, would make an admirable timber and game reserve. It holds the sources of many large streams, is well protected from fire by almost daily rain, and at present contains a large quantity of moose and fur-bearing animals. The timber, certainly, can never be expected to grow very large on account of the shallow nature of the soil, but on the other hand, if what timber there is, is not preserved, there will probably be nothing of value left in these hills at all. Of course it would, first of all, be advisable to have the locality explored to ascertain the exact limit of the very rough area.

West of range 18, the whole country has a better aspect. The soil is much better and although the country is thickly wooded, it is generally with poplar, birch and alders, coniferous trees not being nearly so common as on the hills further east.

If, as may possibly be the case, the line of the Grand Trunk Pacific Railway should pass some ten miles to the southwest of Sturgeon lake and from there across Smoky river to Grand prairie, Sturgeon lake will almost certainly be the shipping point for a large amount of freight to and from the west end of Lesser Slave lake. There is indeed no other feasible way for the lake to have communication with Edmonton except the present roundabout and troublesome route by way of Lesser Slave river and Athabaska Landing. The area of hills stretching along the eighteenth base line cuts off all more direct routes. The road marked on existing maps as 'wagon road to Edmonton,' and running southeast from the west end of the lake, is a quite impracticable route for wagons, and its continuance on maps is very misleading.

For these reasons it seems probable that the country around Sturgeon lake and from there to Lesser Slave lake may become settled at no very distant date.

I wish to express my satisfaction with the careful and accurate manner in which my assistant, Mr. W. T. Green, B.A., carried out his share of the work during the season.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) J. N. WALLACE, D.L.S.

APPENDIX No. 38 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF JAMES WARREN, D.L.S.

RESURVEYS IN SOUTHERN SASKATCHEWAN.

WALKERTON, ONT., April 26, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my work during the season of 1905.

I left Walkerton on June 6 and arrived at Moosejaw on the 10th. My first care was to procure suitable horses for my transport, and I was successful in getting six fair horses, that on the whole gave satisfaction and stood the season's work very well. I arrived at our townships on June 19, and had no trouble in finding our lines. The first township was 12, range 27, west of the second meridian. This township is very

SESSIONAL PAPER No. 25b

undulating and in many places very hilly. There were a few good sections in this township, but not enough to make it desirable for settlement.

Our next township was 11, range 27, west of the second meridian, which was also very undulating and hilly, not many sections suitable for settling or farming. After completing this township we moved into township 10, range 27, west of the second meridian. We found this township also quite undulating, but the hills were not so high as in the two previous ones, but there was not much good land that would be available for farming.

After completing these townships we decided to go south to the southerly part of our work. The first we came to was township 6, range 28, west of the second meridian, where we began work on July 24. This is a very broken township, especially the northern part, and also is broken by part of Willowbunch lake. The water in this lake is quite alkaline, as is a great deal of the water in this district. There were some people preparing to move on parts of the southerly sections in which are some fair sections of land.

Our next work was in township 5, range 29, west of the second meridian, which we found very rough, especially in the northern portion, which is broken up a great deal by deep ravines which slope northerly into the valley or flats of Willowbunch. We found a few ranchers settled in the northern part among the ravines which gave good shelter for stock. The next township—4, range 29, west of the second meridian—was not on the whole so much broken. Yet the land would not be well adapted for farming. We found some fair hay marshes which were readily taken advantage of by the settlers from Willowbunch. After completing this township we went on to township 4, range 25, west of the second meridian, which was our most southerly work. We found this township also very broken in places, also a good deal of alkali, on the southerly borders of Willowbunch lake, but there are some fair hay lands which are taken advantage of for the hay produced. This township and the one to the north of it, township 5, range 25, west of the second meridian, are broken by Willowbunch lake, which last township is divided into three parts by the lake. The surface of this last township is more even, not so hilly as some of the other townships, and there are some sections that would make fair agricultural lands. On completing this township we moved on north to the northerly part of our work, and began on township 10, range 26, west of the second meridian. This township, especially in the northerly part, was very hilly, some of the hills being over two hundred (200) feet high. There were two lakes in this township that had to be traversed, having the water quite alkaline.

Our next township was 10, range 25, west of the second meridian. This we found a very tedious one, as there were nine lakes that had to be traversed—in all about twenty-five miles of traverse. This is also very much broken by hills, and the lakes referred to. Toward the last the weather got quite rough and stormy, so that some days we could not work on account of the snow and rain, and as the season was well advanced, we decided to stop operations for the season. Having completed this township, we went out with our camp furnishings and arrived at Moosejaw on October 24.

My first care after paying off my men was to procure suitable quarters for the horses, which were all in good condition, and quite fit for wintering with safety. I found a rancher, Mr. W. G. Buchanan, who undertook to winter them for \$10 a head, and to properly stable them in stormy weather. I have sent a copy of the agreement to the department, also a list of articles stored which belonged to the outfit.

According to instructions, I corrected an error in a line southwest from Yellow-grass station, of which I also sent in my report to the department, after which I returned home to Walkerton, arriving here on November 16.

I have the honour to be, sir,
Your obedient servant,

(Sgd.) JAMES WARREN, *D.L.S.*

6-7 EDWARD VII., A. 1907

APPENDIX No. 39 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF M. B. WEEKES, D.L.S.

SURVEYS IN MANITOBA.

OTTAWA, June 16, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on my survey operations during the winter of 1905.

In accordance with your instructions of December 12, 1904, I left Brantford on December 26, and proceeded to Dauphin, where I outfitted.

My first work was to complete the survey of the north boundary of Manitoba westerly from the centre of range 27, and to run six miles of the west boundary.

The country through which the line ran is heavily timbered throughout, with a great quantity of deadfall and heavy underbrush. The Canadian Northern railway runs nearly parallel with this line, and rendered the moving of my outfit comparatively easy, until we were ordered off the track by the section foreman.

On checking the position of my starting point, I found the post at the northeast corner of section 33, township 44, range 27, west of the principal meridian, to be eight chains too far east. After correcting this, the work proceeded continuously.

In ranges 27 and 28 the timber is heavy, being poplar and spruce from six to fifteen inches in diameter, and some trees running up to twenty-four inches. The best of the timber, however, has been cut and used in the construction of the Canadian Northern Railway, about a mile south of the line. In section 34, range 28, the spur line to the Red Deer mill of Red Deer lake is crossed. This concern is a large one and employs many men. In range 29 the country is somewhat drier than in ranges 27 and 28, where the land is very low, and in summer must be very wet and boggy.

The east boundary of township 44, range 30, west of the principal meridian, is in heavy poplar and spruce. This line gradually rises toward the south, where its southerly end comes to the Porcupine hills. Numerous creeks cross the line. These drain the Porcupine hills toward Red Deer lake. The base line across ranges 30, 31 and 32 is more open. The country is covered with small spruce and tamarack. There is very little land along the 12th base line in these ranges suitable for agriculture. Occasional small patches, however, are dry enough to grow crops. There is no settlement along this line, except a few sectionmen who work for the railway, and they are chiefly Galicians. This line was completed to the second meridian by February 13, and mounded throughout. I then moved south to complete the survey of the 10th base line as far as Lake Winnipegosis. I accordingly left the railway at Cowan, and having procured fresh supplies from Dauphin, we cut a trail to the northeast corner of township 36, range 22, west of the principal meridian. After producing this line fourteen miles and a half we struck Lake Winnipegosis.

The country along this line is absolutely worthless for farming, consisting of muskegs and large open marshes separated by sandy ridges covered with a good growth of jackpine. While engaged on this line the weather became very mild, and the snow entirely disappeared, and we returned to the railway with our sleighs through two feet of water.

On section 35, township 36, range 21, west of the principal meridian, North Duck river was crossed. This is a stream about forty feet wide and three feet deep.

In section 31, township 36, range 19, west of the principal meridian, the winter trail from Cedar lake to Winnipegosis was crossed. This is the trail by which most of the fish is brought down from Cedar lake.

As the warm weather continued, I was unable to complete the survey of the 8th base line across Lake Manitoba as I had expected to. This part of the country being

SESSIONAL PAPER No. 25b

now all under water and there being no snow, I was compelled to return to Dauphin. Here I sold the outfit according to instructions, and left for Brantford, where I arrived on April 1, 1905.

One remarkable thing about this part of Manitoba is the great abundance of large game. Every day we saw moose and elk and sometimes as many as five or six together.

I have the honour to be, sir,
Your obedient servant,

(Sgd.) M. B. WEEKES, *D.L.S.*

APPENDIX No. 40 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF ARTHUR O. WHEELER, *D.L.S.*

PHOTO-TOPOGRAPHICAL SURVEY OF THE ROCKY MOUNTAINS.

BANFF, ALBERTA, April 30, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—In 1903 a photo-topographical survey of the Railway Belt through the main range of the Rocky mountains was commenced by the writer at the point where it had been discontinued by J. J. McArthur, *D.L.S.*, and has been carried forward continuously since then.

For the past season work was begun early in June, the party leaving for Castle mountain station on the Canadian Pacific railway on the 8th of the month.

On the 9th, accompanied by two assistants, a climb was made to the crest of Tunnel mountain at Banff to obtain the speed of the Camera plates used for the survey.

While in the Vermilion valley during the fall of 1904, the smoke from forest fires was so dense that a large number of the views were rendered quite useless. It was, therefore, necessary first to again visit the valley and occupy some additional stations. Four peaks were ascended from June 13 to 20, with a greatest altitude of 8,682 feet above sea level.

Wet and cloudy weather had now set in and it was found impossible to occupy another station until June 28, when a climb was made to a point on the side of Castle mountain, to supplement inadequate data, due to bad weather the previous season. The altitude of the station is 7,841 feet.

The party next proceeded to Field, B.C., and first made an ascent to a high point of Mt. Burgess, to obtain views of the Kicking-horse flats, lost the year before through smoke. Magnificent views were obtained. The altitude of the point is 8,001 feet. A trip was then made into the Yoho valley and six peaks occupied, the greatest altitude being that of Mt. Collie (10,315 ft.). One other station, overlooking Peyto lake, was occupied at an altitude of 10,015 feet; a third, Kewetinok peak, at the extreme head of the upper Yoho valley, is 9,512 feet; and the other three are about 8,500 feet above sea-level. This second trip to the Yoho valley was also due to the continued smoke of the year before.

There is no place within the tourist portion of the Rocky mountains where so much of varied mountain scenery is compressed into so small an area as in the Yoho valley. It is difficult to express the wonder of the colour contrasts that meet the eye in the ever changing panorama of snow-clad peak, rock precipice, dazzling *névé*, shin-

6-7 EDWARD VII., A. 1907

ing glacier ice and bronze-green forest of pines, midst which nestle magic lakes of changing shades of blue and green.

Work in the Yoho valley occupied until July 18, when a traverse was made of the road from Emerald Lake chalet, one of the Canadian Pacific railway summer hotels, to Field station at the base of Mt. Stephen. The traverse of seven miles occupied the 20th and 21st days of the month.

A portion of the party was now transferred to Cougar creek, some five miles from the summit of Rogers pass in the Selkirk range, and a survey of the newly discovered caves in the Cougar valley commenced. A description of the valley and the caves will be found below. The balance of the party were employed cutting out a trail up the valley of the Amiskwi river, the one line lying immediately west of the Yoho valley.

On August 9, the party, having returned from the Selkirks, pushed northward up the stream named. The distance from the railway to the Amiskwi pass is about 27 miles. Over part of it a rough trail exists; the balance is through primeval forest. Before reaching the pass, a very striking waterfall, on the east side of the valley, dropping fully 800 feet in a series of beautiful cascades, furnishes a feature that may be classed with the Takakkaw and Twin falls. The name of 'Amiskwi falls' is suggested.

Arrived at the summit of the pass, a view of unsurpassed grandeur bursts upon the vision. To the north, across the valley of Blaeberry river, Mt. Mummery (11,000 ft.) mingles its double snowy peaks with the clouds, while down its sides pour from every direction a wild confusion of ice cascades, culminating in one grand torrent of ice, broken and seamed throughout by huge crevasses and reaching far down into the valley. Northwestward lies the historic Howse pass of early fur trading days, and beyond, to the north, rise the giants of the range: Mts. Forbes, Columbia, Bryce, Lyell, Athabaska and Saskatchewan. Here, you are on the farther side of the Wapta snow-field and the north faces of Mts. Habel, Collie and Baker greet the eye. They present sheer rock precipices, rising grandly from the valley below, and between their towers and buttresses pour rivers of ice from the great storage basin of the Wapta snow-field. The valley has wonderful charms of alpine scenery, and excellent fishing, combined with perfect camp grounds, render it a spot well worthy of attention from tourists.

I regret to say that the landscape was again veiled in smoke and, although the party was camped on the pass and at other points along the valley from August 13 to 29, it only succeeded in occupying nine peaks and was unable to finish the work in this locality. Owing to incomplete data, the altitudes are not yet computed.

On September 2, a station was occupied on Mount Hurd at an altitude of 9,265 feet. On September 6, the summit of Mount Vaux was reached; altitude, 10,900 feet. On the 11th, two additional stations were completed on Mount Hurd; and on the 12th, a rock cairn was placed on the crest of Mount Duchesnay, at 9,592 feet, and photographs and azimuths taken therefrom. On September 15, stations were occupied on the west side of Porcupine creek, near Leancoil.

During the entire month of September the weather was very broken, and clouds and rain were much in evidence. For this period, when the party was unable to climb, it was employed making a traverse of the railway, and tying in with the peaks occupied, from Leancoil easterly to Ottertail and westerly towards Palliser.

On September 14 and 16, a traverse was made of the road leading from Leancoil station to Ice river valley, and on the 17th and 18th the party moved up to the head of that stream. Camp was located here until October 1, but it was only found possible to occupy three peaks, and the valley will again have to be visited.

Climbing was now closed for the season, as winter had practically set in on the peaks, so the party returned to the railway and spent the intervals of fine weather, until the 27th, in traversing the railway to a point between Palliser and Golden, in taking views at various points along the traverse and in hunting up and tying in section lines with the traverse and cairns set on the several peaks in view from the railway.

SESSIONAL PAPER No. 25b

On October 28, 30 and 31, a traverse was made of the roads, both old and new, from Laggan station to the Canadian Pacific Railway Company's chalet at Lake Louise; also of the road now in course of construction to Moraine lake. On November 2 the party returned to Calgary, and was paid off.

NAKIMU CAVES.

Nakimu caves are situated in the Glacier park reserve, directly in the bed of Cougar creek, of which they form the present channel, and have been hollowed out through its agency in bygone days. They are six miles from Glacier House, the Canadian Pacific Railway hotel near the summit of Rogers pass.

From Glacier House a good bridle trail traverses the south face of Mount Cheops and leads to Cougar creek water-tank. The trail has been in operation for two years, and each spring is cleared of fallen debris from avalanches by the railway company. The distance is 3.8 miles. It is, therefore, only necessary to construct a bridle path from Cougar creek water-tank to the camp ground at the caves, a distance of very nearly two miles. I understand an appropriation has been made for the construction of this trail as soon as the snow is off the ground.

Although the caves were first visited by prospectors some years ago, it was not until the fall of 1904 that they were brought prominently to public notice by Charles H. Deutschman, a most picturesque hunter and prospector, who was exploring in the vicinity. The writer first visited the Cougar creek valley in 1902, at which time the peaks along its northern boundaries were occupied as photographic stations when mapping the Selkirk regions. The caves were not then seen, as the bottom of the valley was covered by photographing from a great height.

The upper Cougar creek valley is of very special interest for two reasons other than the caves, viz.: (1) It is of that special type known as 'a hanging valley,' or one that has been carved out in a U shaped cross-section by the action of glacial erosion, and not in the form of a V as would have occurred through the action of water erosion alone. It is, moreover, a very pronounced form of its type. The numerous small glaciers that still line the sides and head of the valley give it exceeding great beauty and interest in summer time. (2) I know of no other spot in the Selkirks where alpine flora is more abundant and varied, and this fact alone is an attraction not to be despised. The wealth of colour displayed by the mingled beds of yellow Adder's Tongue (*Erythronium Gigantium*), scarlet Painter's Brush (*Castilleja*), blue Larkspur (*Delphinium bicolor*), crimson and yellow Monkey-flower (*Mimulus*), purple and pink Asters and the False heaths (*Bryanthus* and *Cassiope*), together with numberless other species of greater variety and equal attraction, are marvellous and strike the beholder dumb with wonder and pleasure. As this rich display of colour follows the melting snows up the valley, it lasts well until the end of August.

The writer made three visits to the caves during the past year: the first, at the end of June, was merely exploratory and to ascertain the best means of making a thorough survey of them and their surroundings. The second, from July 23 to August 6, was made with a party, and a detailed survey was completed of the valley and of the two series of caves that had been explored to that date. Later in the month of August, the third and largest series of caves was discovered by Deutschman, and, from October 16 to 21, the writer, accompanied by three assistants, of whom Deutschman was one, made a survey of the newly discovered series.

The caves comprise a labyrinth of passageways, cut through a ridge of dark blue limestone forming the floor of the valley. The limestone adjacent to the passageways is partially marbleized, in several places showing grotesque markings in white crystallized lime. At intervals, the passages open into curious circular potholes, descending one to the other in a succession of steps. There are cavernous openings and deep abysses, into which subterranean waterfalls leap with a thunderous vibrating roar, rendering the pitch-black depths, lighted only by the feeble rays of lanterns, unearthly in the extreme. Overhead, weird spurs of rock reach forth in fantastic shapes. Here

6-7 EDWARD VII., A. 1907

also are marble halls, and walls and ceilings frescoed in florescent creations of snowy whiteness which may for a moment, by means of a flashlight, be wrested from the stygian darkness.

Throughout the entire system, the floors are of broken jagged rocks, seamed and traversed by cracks, and, in many places, only accessible to skilled climbers. In several instances, the passages are so narrow and low as to require much squeezing and wriggling to admit of the body.

The outside surroundings are intensely wild. The stream disappears into the ground to reappear at some depth below in a swirl of foaming cascades; then disappears again into a cave opening with a grand leap of broken water and flying spray. It is next seen at the bottom of a deep gorge, spanned by two natural bridges, within whose gloomy depths is situated the entrance to the final series of caves. The descent to this entrance has heretofore been effected by an almost perpendicular climb down the steep rock sides by means of a knotted rope, eighty feet of a drop.

The entire series is encompassed within a mile, the subterranean stream eventually joining the surface flow of Cougar creek at some point below, which has not yet been located definitely. Many improvements will be required before the caves are made readily accessible, but even as they stand they are most fascinating and well worthy of a visit, not only on account of their own awe inspiring and unique sights, but from the grand display of alpine surroundings with which this glaciated valley is replete.

The writer and his staff have completed a topographical map of Cougar valley, on a scale of $\frac{1}{15000}$, showing its general formation and features. On the same sheet is a map of the caves system, to a scale of 100 feet to an inch. The map, together with an illustrated monograph on the subject, will be submitted shortly for publication in connection with the advertising of this most attractive feature of Glacier park at the summit of the Selkirk range.

STATISTICS OF THE SEASON'S SURVEY.

Of 147 days, comprising the field work, 35 were lost owing to wet and cloudy weather and 10 through smoke from bush fires. In all, 40 ascents were made and 86 camera stations occupied, from which 347 plates were exposed. The greatest altitude attained was 10,900 feet above sea level. At each camera station, a round of azimuths was taken on surrounding stations and to obtain orient points for the views.

Of traverse, 21 miles of railway and 25 miles of road were measured. Along the railway all courses were chained twice to ensure accuracy.

During the early part of the summer, Seed's non-halation L. Ortho plates were employed as giving the finest results while the light and cloud effects were at their best. For the latter part of the season, Cramer's slow isochromatic plates were used, yielding better results for the longer exposures required.

OFFICE WORK.

The work in the office consisted of developing the negatives and making solio prints from the same. Plotting enlargements, also, were made from the negatives, one of the assistants of the party, skilled in such work, being sent to Ottawa for the purpose.

The remainder of the winter was spent in making the map referred to above, in plotting the camera stations and traverse and computing the altitudes of the former, and in contouring the general map of the portion of the main range covered by the survey. It is expected that another season will complete the data required to furnish a general map for tourist and other purposes.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) ARTHUR O. WHEELER.

SESSIONAL PAPER No. 25b

APPENDIX No. 41 TO THE REPORT OF THE SURVEYOR GENERAL.

To the Honourable FRANK OLIVER,
Minister of the Interior,
Ottawa, Ontario.

SIR,—I have the honour to submit an illustrated monograph dealing with the recently discovered underground waterways, situated in the valley of Cougar creek at the base of Mount Cheops. They lie close to the Canadian Pacific Railway's hotel near the summit of the Selkirk range, within the railway belt in the province of British Columbia, and, on this account, are easily accessible.

Owing to their unusual structure, the absence of stalactites and stalagmites, and their peculiarly shaped and much ruined caverns and passageways, pointing to the agency of seismic disturbances as a very appreciable factor in their origin and present condition, they are of the deepest interest, and well worthy of a visit.

Independently of the caves, the upper valley of Cougar creek is one of the most beautiful glaciated alpine valleys in the entire Selkirk region, and abounds with instruction and pleasure to all lovers of nature. Considered as an asset and attraction of Glacier park, near the centre of which they lie, the caves and their valley are of much value, and will become more so as they are made of easier access to the traveling public.

Accompanying this monograph is a topographical map of the entire valley and of the peaks enclosing it, shown by contour lines of 100 feet equi-distance; also, on the same sheet, a detail map of the subterranean passages comprising the caves system and of the topography of their immediate vicinity.

Respectfully submitted,

ARTHUR O. WHEELER,
Topographer, Department of the Interior.

NAKIMU CAVES.

By ARTHUR O. WHEELER, F.R.G.S.,
Topographer, Department of the Interior.

APPROACH TO THE CAVES.

From Glacier House as a centre, the caves may readily be reached in five hours, and when the trail, now in course of construction, from Cougar creek water-tank at the railway, to the camp at the caves, is completed the journey may be done in less time. It would, however, not be possible to see the various systems and return the same night, so advantage may be taken of the good camp accommodation that is provided for visitors.

At Glacier House, a number of saddle and pack ponies are kept during the summer season and are available for travel to the caves, a distance of very nearly six miles. The trail starts quite close to the hotel, on the north side of the Illecillewaet river, and skirts along the base of Mt. Cheops for three miles, passing through some magnificent forest growth of cedar, fir and hemlock. It touches the railway at the loop about halfway, and, cutting across a bend of the river, does not again strike it until nearly at the tank. From this point, while the trail up Cougar creek valley is being completed, it will be necessary to proceed on foot.

At first there is a steep pull up through a belt of forest and then the path traverses the hillside, still keeping on the slopes of Mt. Cheops, through a dense growth of bracken, rank grass and alders. For this portion, the grade is a falling one to the bed of the stream, which is then followed for, practically, the rest of the distance. The stream is a wild mountain torrent, leaping in a white swirl of foam from boulder to boulder. Its precipitous rush and deafening roar, to which may be added the shrill, incisive whistle of the mountain marmot, render the surroundings most impressive and mysterious.

As you proceed upward, about one and a third miles from the tank, you come to a spot in the creek where water is seen welling up out of the ground; beyond, the volume of the stream is much diminished. This place is supposed to be wholly, or in part, the exit of the underground flow from the caves. A third of a mile farther on, at a certain spot, no matter how sultry the day, a shaft of cold wind strikes you and, on looking for the cause, you observe two narrow lateral cracks in the rock strata across the creek. Crossing the stream, for closer observation, it is found that a sharp current of air similar to that produced by an electric fan, but stronger, is proceeding from somewhere in the interior of the mountain. This is the first intimation you get of the caves. The place is shown on the accompanying map as 'The Wind Crack.'

Continuing upward, a most picturesque waterfall of about 60 feet is seen breaking over the cliff and disappearing in an opening of the caves directly below it. It has been named 'The Goat Falls' and contributes its volume to the subterreanean stream flowing through the caves.

Swinging to the left, a climb of some 200 feet up a narrow gully, where the hill-sides close together, brings you to the entrance of the Upper Cougar creek valley and the first of the cave openings. Directly above on the right is 'Point Lookout' (Plate IX.) commanding a grand view of the distant Illeciliewaet glacier and the peaks and snow-fields to the south. It also embraces the entire length of Cougar creek, up which the journey has just been made. Immediately beyond Point Lookout, is the cave opening referred to, leading in pitch darkness to a sheer drop of 120 feet to the bottom of 'The Pit,' as it is termed. The little draw we are following between the ridges is now cut off by 'The Gorge,' a deep gash in the valley, at the bottom of which flows Cougar creek. The trail therefore turns to the left and almost directly reaches the visitors' camp ground. The tents are pitched on a little grassy bench, bright with alpine flowers and surrounded by graceful waving spruce trees and aromatic-smelling balsams, of whose branches the visitors' beds are made. Across a small ravine, reached by a path cut in the hillside, is the camp of the guide and caretaker, placed directly under the trees. Altogether, it is a charming spot, full of sights that are new and interesting. All around are sweet mountain smells, and the dull roar of the creek leaping into the caves close by has a most soothing effect.

DISCOVERY AND EXPLORATION OF THE CAVES.

Messrs. D. Woolsey, of Revelstoke, and Walter Scott, of Nakusp, are reported, while prospecting in the Cougar valley, to have been the first persons to see the caves. They then descended to the bottom of 'The Gorge' by means of a fallen tree trunk leaning against the side (Plate X.), a rather perilous means of descent. No importance was at that time attached to their discovery.

In the summer of 1902, the writer passed close to the caves on his way to occupy, as photographic stations, the two high peaks at the head of the valley on the north side, but he was then camped on the summit of Baloo pass, between Bear and Cougar creeks, and did not visit the bottom of the valley where the caves are.

In September of the same year, a Mr. and Mrs. Weiss made the ascent of Cougar Mt., accompanied by the Swiss guide, Edouard Feuz. They speak of the Goat falls seen about halfway up the valley as well worthy of a visit 'if a trail of some sort could be established through the bush.'

SESSIONAL PAPER No. 25b

It was not, however, until May of 1904 that the caves were discovered, in series, by Charles Henry Deutschman, of Revelstoke, a British subject. He was prospecting for minerals and hunting big game when he found them, and, according to his personal statement to the writer, he located them as a mineral claim on October 22 of the same year. The first person to enter the caves after C. H. Deutschman was A. Johnston, editor of a Revelstoke newspaper, the *Mail-Herald*.

On May 29, 1905, a party of twelve persons visited the caves, all of whom were residents of Revelstoke, excepting Howard Douglas, of Banff, Superintendent of the Rocky Mountains Park, W. S. Ayres, M.E., then resident at Banff, and R. B. Bennett, Associated Press correspondent, of Vancouver. The party was organized for the purpose of enabling W. S. Ayres, an expert underground engineer, to report upon the discovery to the Dominion government, for the caves had now been ascertained to be situated well within the Glacier Park reserve. Mr. Ayres, with a portion of the party, remained until June 3, to make surveys and explorations. His report, dated June 8, 1905, and accompanying map will be found in the appendices hereto. As the valley generally was at that time of the year largely filled with snow, it was deprived greatly of the natural beauty that attaches to it during the summer time, and most of the photographs taken were what might be termed winter scenes. The next visit was made by the writer on June 27 and 28, accompanied by C. H. Deutschman and the Rev. Dr. Herdman of Calgary. It was a preliminary trip to size up the situation and make plans for a thorough survey of the caves and locality at a later date, when the snow should have completely gone from the floor of the valley, for there was still abundance of it at the date named.

Having looked over the ground and visited the caves as far as they had been explored, the matter was allowed to stand until July 23, on which date a portion of the writer's survey party was transferred from the Main range and put in camp beside the track at the Cougar creek water-tank. Signals were promptly erected, and a photographic survey made of the entire valley of Cougar creek and of the peaks enclosing it. As soon as this was completed, work was taken up in connection with the caves, and a location made of them as far as then known, both above and below the ground. For the valley, the usual photographic methods were employed. To delineate the topography in the immediate vicinity above the caves, the transit, compass and level, aneroid barometer and chain were used; and for the interior of the caves an Abney clinometer, aneroid barometer, prismatic compass and steel tape. Acetylene bicycle lamps were used for lighting purposes and found to work well.

Up to this time, only the Gopher bridge series and the Mill bridge series (see map) had been explored. It was not until a day or two before the close of the survey, August 4, that an attempt was made to penetrate the huge opening seen at the north end of the bottom of the gorge. On the date named, the writer descended by means of a knotted rope, and was followed by Deutschman. The stream was then at high water, and pouring into the opening with a tremendous rush and swirl of waters. Although the creek was crossed by wading waist deep in the icy torrent, it was found impossible to penetrate more than a couple of hundred feet into the depth. Later in the month, Deutschman, alone and unaided, penetrated this opening and worked his way across the stream, discovering what is now referred to as the Gorge series, or the series of passageways reached by the opening from the Gorge. And here the writer begs to say a word or two concerning this remarkable man. The work of exploration he has done without assistance, shows a character utterly devoid of fear. The descent into depths of blackest darkness, lighted only by the dim rays of a tallow dip, without a rope or other aid except in a case of direst necessity, requires more than courage; it requires strength of purpose and power of will far beyond the ordinary degree. For, added to the thick darkness, there was always the fierce vibrating roar of subterranean torrents, a sound most nerve-shaking in a position sufficiently uncanny and demoralizing without it. Huge cracks had to be crossed and precipitous descents made in pitch darkness, where, it is safe to say, a misstep would have meant death.

6-7 EDWARD VII., A. 1907

either suddenly or through disablement. Now that ladders are placed and ropes set, and the sure path pointed out by this intrepid guide, it is difficult to realize how in the first place the passage could possibly have been made without.

The first visitor after Deutschman to the Gorge series was a Mr. Lang, of Golden, B.C., who very nearly met with a serious accident when climbing up the rope from the bottom of the Gorge to the floor of the valley, eighty feet above. He had nearly reached the top when his strength gave out, and he slid back down the rope, arriving at the bottom in a much bruised condition, but fortunately with no bones broken.

The next visit was of a party headed by Mr. Howard Douglas, Superintendent of the Rocky Mountains Park, Banff, on September 20, and included representatives from Brandon, Winnipeg and Revelstoke. The party descended to the bottom of the Gorge by a rope, and penetrated some distance into the interior of the newly discovered series. They appear to have been much impressed by what they saw.

With three assistants, of whom Deutschman was one, the writer again visited the scene from October 16 to 21, and made a thorough survey of the Gorge series, as far as known to Deutschman, and also explored a number of new passageways. There was snow on the ground two feet deep, and it was a pleasant relief to withdraw from the Arctic winter of these exalted heights to the warm interiors of the dismal caverns below the surface.

A final exploration was made by W. S. Ayres, M.E., from October 25 to 29. He also made a survey, covering the same ground as that surveyed by the writer, with the addition of several hundred feet of new passageways (shown in red on the accompanying map). A heavy fall of snow had taken place since the 21st, and Mr. Ayres mentions four feet on the ground at the time of his visit. His report of this second exploration and map covering his survey will be found in the appendices hereto.

DESCRIPTION OF THE VALLEY OF THE CAVES.

The valley of Cougar creek is divided into two parts of distinctly different characteristics. The upper valley, a great spoon-shaped basin extending from Lookout point to Cougar pass, is a most pronounced form of the type known as 'hanging valley,' or one that has been carved out in a U shaped cross-section by the eroding power of a glacier at one time filling up its bottom. This glacier has now shrunk to very small proportions at the extreme head of the valley. The floor is on a comparatively low grade and, at one point, is covered for about half a mile by a small lake-bed in which some water lies during the summer. The entire length of the upper valley may be put at $2\frac{1}{2}$ miles. It is inclosed by the rocky steep slopes of Mt. Bagheera, Catamount peak and Mt. Uusus Major, on the north, and of Cougar Mt. on the south. On the sides of these massives are small glaciers, busy at work tearing down the entire structures. At the head of the valley Cougar pass leads across the shrunken glacier to a steep ravine descending to the railway at some distance below Ross Peak station.

It would be difficult to find a more beautiful example of the Alpine valley. In every direction silver waterfalls leap down the sides from the glaciers and melting snows of the surrounding peaks. These collect at the bottom of the valley in one central stream which bounds in foaming cascades to the little lake-bed mentioned above. It leaves this and, continually augmented by falls from above, rushes through luxurious meadows in a second series of cascades that have worn down to bed rock, showing where a thin veneer of soil is overlaying it. The alpine meadows and park-lands as well as the open mountain slopes of the valley are throughout the spring and summer decked with a gorgeous array of flowers of varied hues which, in places, are so profuse and brilliant that it seems as though nature had spread a carpet of rainbow colours for the delight and wonder of her visitors. In early spring, the giant Adder's Tongue (*Erythronium giganteum*) covers whole acres with a brilliant yellow. These flowers are the first, and may be seen pushing their heads up through the snow. Like all spring flowers in this region, they follow the melting snows and may be found higher up in the valley as late as August. Almost coincident with them is the Globe flower (*Trollius laxus*), a plant of much beauty and great wealth of blossom. Next come the scarlet and crimson Painter's Brush (*Castilleja*), showing everywhere in the opens and

SESSIONAL PAPER No. 25b

on the lower slopes with a blaze of glory. Later still, the blue Larkspur (*Delphinium bicolor*) and purple and pink Asters replace the earlier series, the crimson and yellow Monkey-flower (*Mimulus*) are found in the beds of the streams and where moisture is prevalent, high up the valley and on the alp-lands below the rocks are seen the False heaths (*Bryanthus* and *Cassiope*) and, highest of all, the pink-flowering moss (*Silene acaulis*), found in magnificently flowered bunches directly below the ice. There are very many other species more rare, and just as beautiful in blossom, but of not such frequent or noticeable occurrence.

The timber consists, in this upper valley, chiefly of spruce and balsam; trees which, at this elevation, in the Selkirks attain a grace and beauty that is not noticed in the more crowded areas of lower altitudes. Here they rise symmetrically to a great height and their sweeping lower boughs form shaded canopies that are most inviting during the sultry summer weather.

As the head of the valley is approached, a short climb will convey the explorer to the ice of several small glaciers where he may study with ease their formation and action, look into miniature crevasses and see how moraines of rock detritus are formed by the downward flow of the ice.

At the site of the caves, Cougar creek valley turns from a northeasterly to a southeasterly direction and falls sharply 2,000 feet from Lookout point to the tank, as compared with 1,200 feet for the upper valley in the same distance, about two miles. The lower valley is V-shaped and has for the most part been carved out by the action of water erosion. The sides, except immediately adjacent to the railway, are timbered only in patches and are for the most part covered by closely growing alders, bracken and rank grass, which have replaced the timber where the slopes have been swept clear by avalanches from the heights above. Through the latter half of this section of the valley the stream flows in a narrow canyon and the fall is steep. As soon as the corner is turned and the slopes of the Illecillewaet valley reached, a magnificent forest growth of Douglas fir (*Pseudotsuga Douglasii*), hemlock (*Tsuga Mertensiana*), cedar (*Thuja gigantea*), and a few scattered trees of white pine (*Pinus strobus*) is passed through.

From a natural history point of view the upper valley is exceptional, due largely to the absence of visitors in the past. The Rocky Mountain goat (*Haplocerus montanus*) may be seen frequently, and his tracks are everywhere along the heights. During one of our visits a grizzly bear (*Ursus ferox*) was killed by Deutschman. The black bear (*Ursus Americana*) is plentiful at the head of Bear creek across Baloo pass and it may be safely assumed that he does not fail to visit Cougar valley. Of the smaller mammals, the hoary marmot or whistler (*Arctomys Columbianus*) is plentiful in both the upper and lower valley and is here found in larger numbers, larger in size and giving forth a louder and more shrill whistle than in the Main range of the Rockies. Its startling note is very human and resembles much the noise that delights the heart of the small boy, produced by placing the fingers between the lips. Say's squirrel (*Spermophilus lateralis*) and Parry's marmot (*Spermophilus Parryi*) are also found, the latter in great numbers. The Little Chief hare (*Logomys princeps*) is frequently seen disporting itself among the rocks and its comical antics and quaint squeak, resembling that of a toy rabbit, are very amusing.

The birds are few, and in the upper valley are chiefly confined to the Ptarmigan (*Lagopus leucurus*), of which a flock may nearly always be seen, the Water Ousel or Dipper (*Cinclus Mexicanus*), a funny little dark grey chap who flits from stone to stone along the cascades and falls of the valley, continually bobbing and dipping as though it were the object and aim of his existence. This bird has a very sweet note. Of other birds, the black-headed Jay (*Cyanocitta stelleri annectens*) and the Rocky Mountain Whisky Jack (*Perisoreus Canadensis capitalis*) are the most apparent.

Taken as a whole, this wonderful valley is worthy of a visit quite independently of the attractions offered by the caves, and it would be difficult to find a more representative or better type of valley to illustrate the various phases of nature in the Selkirks—scenery, geology, natural history and botany.

6-7 EDWARD VII., A. 1907

DESCRIPTION OF THE CAVES.

Gopher Bridge Series.

On leaving the lake-bed above mentioned, Cougar creek flows in a series of cascades for a little more than half a mile through open alpine meadowland broken here and there by knolls crowned with scrubby spruce. Suddenly, without warning, it drops into a cavity (plate XI), and 450 feet further down quietly issues from its underground way. During this disappearance the stream has only dropped 30 feet. The intervening space between the entry into and exit from the ground has been named 'Gopher bridge' by the first party visiting the caves, owing to the large numbers of Parry's marmot, which much resembles a gopher, to be seen in the immediate vicinity, and the underlying passages are here referred to as the Gopher bridge series. Directly opposite the disappearance of the creek two striking cascades tumble down the mountain side, and uniting flow for a short space parallel to Cougar creek; then, vanishing into a hole in the ground, they join the main stream by a subterranean passage. They are known as 'Gopher falls,' and the place where they disappear as the 'Gopher hole' (see map of caves).

The Gopher bridge series of passageways was at first entered by the opening shown on the map as 'Old entrance.' It was a very disagreeable operation, entailing much wriggling and squeezing through narrow cracks over dirty rocks. Eventually, a point of vantage was reached directly over the subterranean torrent. At the time of the first exploration the writer took acetylene bicycle lamps, whose bull's-eyes enabled the pitch darkness to be pierced to some extent. Magnesium wire also was lighted, and by its aid, for a brief minute, the interior was bathed in dazzling brightness. Standing on a narrow ledge that overhangs a black abyss, the eye is first drawn by a subterranean waterfall heard roaring immediately on the left. It appears to pour from a dark opening above it. Below, between black walls of rock, may be seen the foam-flecked torrent hurtling down the incline until lost in sense shadows. Overhead, fantastic spurs and shapes reach out into the blackness, and the entire surroundings are so weird and uncanny that it is easy to imagine Dante seated upon one of these spurs deriving impressions for his inferno. As the brilliant light goes out the thick darkness makes itself felt, and instinctively you feel to see if Charon is not standing beside you. This subterranean stream with its unearthly surroundings is somewhat suggestive of the Styx, and incidentally supplied the name 'Avernus' for the cavern of the waterfall.

At one time the stream entered by this opening, but a natural dam has gradually been formed causing it to find a new opening at the spot where it is now shown disappearing on the map. About midway between the entrance of the creek and the old entrance, Deutschman has excavated a small natural opening to a size sufficiently large enough to admit an average person with comfort. A small passage joins with the underground way of the creek, and by following along its edge you eventually come to the point of vantage previously described. En route, several small chambers are passed, originally carved out of the rock in the form of potholes by the swirl and swish of the waters, but since, much distorted in shape owing to disintegration of the cleavage planes. The spot is unique and wonderful, and the sensations it produces eerie in the extreme. It is well worthy of a visit.

Mill Bridge Series.

On making its exit at the eastern end of Gopher bridge, Cougar creek pours down a narrow rock-cut for a distance of 350 feet, when it again disappears in a whirl of flying spray below the surface of the valley. It reappears, 300 feet farther on at the bottom of a deep gorge, having dropped 85 feet while underground. The interval between the exit and entrance has been named Mill bridge by the party previously mentioned, on account of the roar of the water as it rushes underground through the choked entrance, resembling the noise made by a big mill in full operation.

SESSIONAL PAPER No. 25b

The rock-cut above referred to is narrow, about eight to ten feet wide, and of regular appearance. The upper half presents a series of cascades and falls, and the sides show curious small potholes that are in the process of erosion from the soft limestone. It has been named 'The Flume' owing to its resemblance to a millrace. There are several openings at the point where the creek disappears and its last spectacular leap as it vanishes underground is very striking. Seventy feet farther east is a larger opening, at one time the point where the stream disappeared, but as the rush of water cut deeper in the rock channel it took advantage of a handy crack and gradually carved out for itself the opening where the full volume now descends.

About the centre of the Flume, on the eastern side and thirty feet from it, is the entrance to the Mill bridge series of the caves, shown on the map as 'Entrance No. 1.' This entrance is a mere cleft in the rock strata, and is only wide enough to admit of the passage of a man's body (see cut). The total length of the underground passageway, at one time accommodating a very considerable volume of water, is 400 feet. The height varies from a minimum of ten feet to a maximum of 25 feet and the width from three to fifteen feet. At its eastern end it opens to an irregularly shaped chamber of approximately sixty by seventy feet, with a greatest height of twenty feet. This chamber has been named 'The Auditorium' by the first exploring party. Cougar creek in its flow beneath Mill bridge passes through the Auditorium, and as it falls 75 feet in a distance of 200 feet, from its entrance beneath Mill bridge to the Auditorium, the chamber is replete with its roar and the name is appropriate, though hardly in the conventional sense of the word. Faint daylight enters through the passageway of the waters and serves to make the surroundings look dim and mysterious. The frosts of winter, also, reach this spot, and in the spring stalactites and stalagmites formed of huge icicles are seen in columnar groups surrounding the dashing waters and extending some distance into the chamber itself. In this particular spot disintegration has created much havoc, and the walls no longer show the marks of water erosion while the floor is heaped with rock debris fallen from the ceiling. The passageway, however, that connects it with the surface is still intact as a sample of the power of water erosion. It is composed of a series of potholes connected one with the other by short narrow passages. The bottom of each succeeding pothole, as you recede from the entrance, is at a lower elevation, sometimes as much as ten or fifteen feet. To make access possible, Deutschman has, with the assistance of a bridge carpenter loaned by T. Kilpatrick, Superintendent of the Canadian Pacific Railway Company at Revelstoke, placed rough ladders from floor to floor. Most of these potholes hold water in the hollows at the bottom and, in one case, the water is so deep—four or five feet—and the potholes so wide that a floating bridge had to be built. When it is realized that every bit of timber used in these constructions had to be hewn from the tree and transported on the shoulder or back over a road hardly accessible for a mountain goat to the place where it was utilized, some idea of the magnitude of the work can be formed.

At one spot the passageway twists in a loop, and here the potholes are of such a curiously spiral form that it has been named 'The Corkscrew.' Across this bend about twelve feet above the main floor a gallery extends for 120 feet. It is of a similar pothole formation, but on a smaller scale than the main passageway. Directly below it, at the lower end, is a peculiar sharp spike of rock that has evidently been subsequently carved out by water pouring from this gallery, as is readily shown by the erosion marks on the component rocks. In addition to the lines of erosion on the rock spike and in the gallery pothole, honey-combing is seen on the right and high up on the left and, still further on the left, spatulated markings to the depth of half an inch, or a little over, which is a very common feature in all three series.

Throughout the Mill bridge series, with the exception of the Auditorium, the floors and ceilings are of water-worn rock, and practically no debris has fallen away, pointing to the fact that this channel is of more recent origin and the rock through which it has worn of a more compact stratification.

6-7 EDWARD VII., A. 1907

At one time it was reported that the roof of this passage was set with sparkling quartz crystals. It turned out, however, that they were only drops of water that had collected through leakage or condensation. Some of the potholes are very curiously marked by thin incrustations of carbonate of lime spreading over their concave surfaces in florescent patterns. Overhead in many places are seen projecting spurs that have withstood the action of the water owing to superior hardness, or that, through some deflection of the current, have not had the same force brought to bear upon them. The waters of Cougar creek are derived from the melting glaciers and snow deposits lining the sides of the peaks enclosing the valley and, in consequence, carry a considerable quantity of sediment composed of very fine rock particles. The quantity of sediment carried would, of course, be greatest when the stream was at flood stage. This sediment has doubtless been a factor of much importance in the erosive power of the waters, and a residue may to-day be seen as a very thin mud-coloured coating on the walls and floors of the passageways, where it has been deposited by the subsiding waters. At a very high stage of water in the creek there was an overflow into Entrance No. 1 that made the first exploration by W. S. Ayres and party of wet and somewhat dangerous operation. This overflow, however, was dammed back by Deutschman, and no further trouble has since been experienced with it.

The Gorge Series.

As stated above, the exit of Cougar creek from Mill bridge takes place at the bottom of a narrow crack or gorge, running at right angles to the general direction of the stream. The Gorge is 300 feet in length, about 50 feet wide and is spanned by two natural rock bridges. The sides are composed of badly shattered limestone. On emerging from its subterranean course beneath Mill bridge, the creek flows through the Gorge 80 feet below the floor of the valley. At the lower or north end is the opening that leads to the largest and most interesting of the series of passageways forming the Nakimu caves. The Gorge forms a very striking feature of the external scenery, and several places are accessible from which views may be had into its depths that are wild and impressive in the extreme. The opening is a dome-shaped break in the wall forming the north end. Into this the stream tumbles with wild fury over a confusion of huge fragments of rock piled up in the passageway. It creates leaps and falls and a dissemination of spray that makes the opening to the outer world, as seen from below, appear through a luminous mist. The aperture is some thirty feet wide and about the same height.

Proceeding downwards, at the foot of the falls, the channel resumes its normal direction of a little south of east. It is necessary here to cross the stream, which swings northward into lower depths, and from now on the passageways are quite free from wet, though somewhat damp from the moistness of the atmosphere. At the turn of the creek's direction you enter a chamber 150 feet long, 25 feet wide and from 10 feet high at the upper end to 30 feet at the lower end. This chamber is dimly illuminated by the daylight from outside. It is in a bad state of ruin and the floor is heaped with debris thrown from the ceiling and sides. The roof is composed of one immense slab of rock sloping with the dip of the strata. The creek has broken through the northeast wall nearly in the middle of the chamber and disappears into the blackness with a dull reverberating roar. Fifty feet beyond the creek, the passage turns north again and it is necessary to descend a rock face of some twelve feet. On it are natural notches or footholds that would seem as though they had been cut with a cold-chisel for the special purpose; for persons unaccustomed to climbing, it is well to use a rope to steady the descent at this spot. The creek is now heard far down, welling through some rock-cut with a dull intermittent pounding, resembling the blows of an immense sledge-hammer. Forty feet to the right, through a low-roofed passage about two feet high, you creep into 'The Dropping cave.' It is about 30 by 40 feet and 6 to 10 feet high, and so named from the fact that water drops from the roof in all directions. The floor is composed of broken rock fragments and the walls

SESSIONAL PAPER No. 25b

and ceilings of dark blue limestone marked in places by irregular streaks of white crystalline calcite. At the eastern end, a very narrow passage between fallen masses of rock, affording barely room to squeeze through, leads to 'The Witches Ball-room.' It is $1\frac{1}{2}$ to 2 feet wide, 3 to 4 feet high and some 20 feet in length.

The Ball-room is roughly triangular in shape with sides of about 66 feet and an estimated height of 50 feet. The largest portion of the space is occupied by an enormous rock that has fallen from the roof. This rock has a generally level surface, and is just the spot where a group of witch-hags might be expected to caper round the ghastly fumes of some hellish cauldron at a Sabbath meeting; hence the name, in sympathy with the ill-omened and weird surroundings. On all sides except that of the passage are deep cracks partly choked up by fallen blocks but still exposing many deep and pitch-black holes leading to the unknown, where the underground stream is heard roaring dully. By one of these, at the northeast corner of the chamber, W. S. Ayres and C. H. Deutschman penetrated to 'The Terror' and 'The Old Mill,' the former sixty odd feet below the Ball-room. Their explorations in this quarter are shown on the accompanying map, in red, and a description of them will be found in Mr. Ayres' supplementary report attached hereto. Many of the fallen blocks show crystalline calcite markings similar to those found in the Dropping cave.

Leaving the Ball-room the passage leads southeasterly for a distance of 125 feet to where there is a parting of the ways. The upper end is a vaulted chamber, 15 to 20 feet wide and about 20 feet high, a crack on the left, leading to the depths below, has been partly filled by fallen rock debris. The broken blocks of which the floor is composed show crystallized dark blue limestone, veined with white ribbons of calcite. For the lower portion, the passage lies between separated limestone strata from 3 to 7 feet apart; the floor of broken boulders and slabs, is very irregular. Both roof and floor are water-worn and show erosion markings. They descend until they meet 20 to 30 feet below. The subterranean stream is heard with a muffled roar on the left. On the right, three passages, met at intervals, lead to two circular funnel-like chambers, the more distant of which has been named 'The Pit.'

It is now necessary to return to the surface and seek ingress to the caves by means of Entrance No. 3 (Plate XII), not far from the Gorge on the eastern side. Entrance No. 3 is close by Lookout point and is the first accessible opening seen on the journey up the valley. A descent is made some 10 or 12 feet by a rough ladder placed by Deutschman, to a small cavern where there is just room for three persons to crouch. Off this, a very narrow slit, through which it is barely possible to squeeze, open to a narrow chute. Down this chute, by means of a rope placed around the body, a descent can be made some twenty feet, to the brink of space. From the final ledge, a stone will drop a long way before it strikes. The total distance from the opening to the brink of the Pit is sixty feet.

When surveying the Gorge series, the writer discovered a very peculiar passage, shown on the map as the 'Marbleway.' It was of a perfectly eroded structure, composed of a number of small connected potholes in a dark bluish-grey limestone, shot in every direction by ribbon streaks of white crystalline calcite. The walls were dripping with moisture and rendered the limestone dead black and the veins of calcite vivid white, the whole resembling a rich blistening marble. This passage was followed to the larger one shown on the map, and that in turn to the circular chamber named 'The Pit.' It seemed probable that this was the spot where stones, dropped from the ledge attained by Entrance No. 3, first struck, so Deutschman was sent to reconnoitre and, not long afterwards, his face could be seen near the extreme apex of the roof peering down through the dim halo of his tallow dip. A stone tied to a cord and subsequently measured showed the drop to the floor of the Pit to be 120 feet.

The chamber is about twenty feet in diameter and rises like a gigantic funnel to something over the height named. The walls are similar to those of the Marbleway, and some of the effects are very peculiar, reminding the beholder of forked lightning on a dead black background. At the bottom of the Pit was seen a very queer slab of rock, shaped almost perfectly like a monumental tombstone, and having directly in

6-7 EDWARD VII., A. 1907

its centre, as though carved by hand, a cross (+). The descent from the floor of the Pit to the main passage, although slightly precipitous in one or two places, is quite easy, the distance being 120 and 130 feet by the main way and Marbleway, respectively. The walls of the Pit funnel are water-worn and, at one time, a stream flowed into it by Entrance No. 3, doubtless being the cause of the formation of the chamber. The stream, which now only carries off the surplus flow from the melting snows, has found another subterranean opening and joins Cougar creek in its underground way, somewhere beyond the Ball-room.

At the meeting of the ways above referred to, the lower or eastern one is named 'The Slanting Way' from the fact that the passage is formed by a separation of the limestone strata and lies across their dip. The upper passage has an arched roof and has been named 'The Subway.' Both are difficult to traverse; the former on account of the broken debris and sloping rock of which the floors are formed and of two uncomfortably narrow places which can be squeezed through with difficulty; the latter on account of the close proximity of floor and ceiling and the necessity of bending nearly double for a considerable part of the distance while traversing it. The lower passage is the easier of the two. The strata forming the Slanting way are from five to ten feet apart. The slabs of both roof and floor are water-worn and bear spatulated erosion marks, like incipient honeycombing. On the east or left side, as you advance, are deep cracks in the strata at the bottom of whose depths Cougar creek may be heard echoing loudly through the vaulted ways. Stones dropped into these seem to rebound for a long time before resting. About the centre of the Slanting way the cracks in the strata expand and a descent may be made to the bed of Cougar creek below the Turbine. The Turbine is reached by a rather difficult passage requiring some skill in climbing. The end of the passage is an irregular opening in the rock. Across a chasm, at whose bottom flows the main stream, a number of water-spouts rush out with great force and a noise resembling that procured by water falling into the pit of a turbine. For an account of this section see Ayres' report. Near the south end of the Slanting way is a curious pothole on the lefthand side. Directly beyond it the floor and walls are covered by an incrustation of carbonate of lime varying in thickness from two to six inches. It is of a light creamy colour, shading off in some places, to a delicate salmon. The formation has a florescent appearance and resembles most, cauliflower heads set closely together, a simile derived from W. S. Ayres' report. Owing to the beautiful floral decorations, this particular spot has been named 'The Art Gallery.'

Similar decorations are found throughout the caves, though not so extensively as at this and a few other places. At some, there is only a thin veneer of the carbonate formation and, at others, rock-milk (*agaric mineral*) is seen on the floors and boulders. The writer did not observe any stalagmites, nor any stalactites worth speaking of. The longest did not exceed 15 inches, and resembled more than anything else a thin icicle of that length; its chief interest being that it was clear and transparent, as though made of ice, and as brittle as glass.

The Subway is about 10 to 15 feet wide and from 7 to 2 feet high; the roof is arched and covered by moisture drops, which are very unpleasant when they find their way down your back. The floor is of broken rock rising to a ridge along the centre of the passageway.

From the meeting of the ways, just beyond the Art Gallery, the passage continues southeasterly, ever increasing in interest. In the next 200 feet, it varies in width from 15 to 30 feet with a height of 10 to 15 feet. On the right is a narrow twisting side-opening named 'The Gimlet.' On the left are two concave sections of old potholes, leading into the most subterranean depths. They are profusely decorated by florescent carbonate incrustations, the first one being named 'The Dome' from its perfect formation. Minor passageways lead from them at a still greater depth. The most southerly one connects with 'Judgment Hall,' to be described further on (see map). In this section the underground course of Cougar creek crosses the corridor,

SESSIONAL PAPER No. 25b

at a considerable depth below, and the roar of the hidden waters is transferred from the left to the right hand.

A narrow opening, $1\frac{1}{2}$ feet wide and 15 feet long, now leads to 'Carbonate Grotto' where are seen very fine calcium decorations. The cavern containing the grotto is about 60 by 30 feet with a height varying from 10 to 15 feet. For the next 130 feet the passage varies from 8 feet wide and 5 feet high at the upper end to 20 feet wide and 5 feet high at the lower end. The sides are hung with rock shelves and spotted with lime incrustations; the bottom is much impeded by fallen blocks. You now find yourself in a *cul-de-sac* and apparently at the end of the series. Not so, however, for by squeezing through a narrow opening on the right, barely noticeable in the darkness, you are enabled to descend to probably the largest cavern of all, at a depth of 57 feet below the corridor just left. The chamber, 200 feet long, 20 feet wide and 40 to 50 feet high has been named 'Judgment Hall' on account of a pillar which might stand for the pillar of justice. The floor is littered by blocks broken from the roof and sides which lie piled in great heaps at the north end. The roof is roughly arched and the sides rise upwards in parallel ledges resembling shelves. Roof, sides and the rocks piled on the floor are covered by the white calcite and, in many places, present most beautiful patterns and beds of florescent formations. The north end is connected by a rough passage with one of the potholes referred to below the meeting of the ways.

Near the centre of the western wall, a narrow gap leads to a very beautiful though small chamber named 'The White Grotto' by W. S. Ayres. The carbonate decorations here are of great beauty and delicacy. The passage in which the chamber is found is 40 feet long, 15 feet wide and 10 feet high. The final cave has been named the 'Bridal Chamber' by W. S. Ayres, owing to the purity of its lime draperies and the general beauty of its floral decorations. It is small, and beyond this point exploration has not yet been carried. The passage breaks off in a precipice falling to a deep chasm at the bottom of which a subterranean stream, probably Cougar creek, may be heard.

This is the farthest point to which the present survey has been carried. It is 240 feet from the Wind crack, previously referred to as being seen on the way up the valley, and is only 54 feet above it; it is safe to assume that there is a connection between. The wind issuing from the crack is probably due to a water blast caused by the subterranean stream falling into the chasm at the end of the exploration.

There are two other passages, or rather sets of passages, that have not yet been mentioned, viz.: 'The Ice cave,' situated above the deep entrance from the Gorge. It is reached from the valley floor and is not of large dimensions, presenting only one chamber of any size, which has been christened 'The Temple.' The series has been named the Ice cave from the fact that the initial passage entrance is blocked by ice all the year round and an entry is effected over this blockage.

The second set of passages are entered immediately below the Goat falls, which pour into them until late in October, when they become ice-bound. Last October, the writer followed two of the passages—one for about 150 feet, the other for about 50 feet—but could get no further without material for bridging. The formation resembles the passage leading to the Auditorium, but on a smaller scale, viz.: a series of well formed potholes connected one with the other. It is assumed that the flow from the Goat falls, the big bulk of which passes through these two channels, empties into the main waterway at the Turbine, but its course may possibly be more direct. If it does not, however, it is difficult to know where the water flowing in at the Turbine comes from.

It is still something more than half a mile from the end of the present exploration to the final point at which the subterranean waters of Cougar creek are returned to the surface bed. There may consequently be accessible passageways that are yet undiscovered but, as the surface grade over this unknown interior is much steeper and the subterranean creek bed is approaching the surface, it seems probable that, if existing, they will be found inaccessible.

The fact of W. S. Ayres having at two places within the Gorge series reached

6-7 EDWARD VII., A. 1907

the actual bed of the subterranean stream would point to there being no further passages below that level. It would, therefore, appear that the largest accessible portion of the series is now on record. Much of the part shown in red on the accompanying map is difficult of access and dangerous to unskilled climbers. Indeed, for that matter, there are plenty of difficult places throughout.

FORMATION AND STRUCTURE.

Three samples of the limestone rock from which the caves have been carved were submitted to Dr. G. C. Hoffman, Chemist and Mineralogist of the Geological Survey Department at Ottawa; as also samples of the calcium carbonate incrustations found upon the walls of the several interiors. Of these specimens, A was from the Auditorium, B from within entrance No. 3, and C from the bottom of the Pit. D and E, of calcium carbonate formation, were respectively from the White Grotto and Judgment Hall. Concerning the specimens Dr. Hoffman writes as follows:—

‘Specimen A, from the “Auditorium,” is a light bluish-grey, fine-crystalline, massive, non-magnesian, slightly ferruginous limestone.

‘Specimen B, from “Entrance No. 3,” is a light and dark bluish-grey, banded, fine-crystalline, massive, non-magnesian, slightly ferruginous limestone.

‘Specimen C, from the “Pit,” is a dark bluish-grey, fine-crystalline, massive, slightly magnesian and slightly ferruginous limestone, traversed by tortuous veinings of white (crystalline) calcite.

‘Specimens D and E, the so-designated “Lime formation on walls and ceilings throughout the caves,” consist of a very light buff-coloured coating, having a botryoidal surface of from half an inch and less to a little over two inches in thickness, of a non-magnesian, very slightly ferruginous carbonate of lime.’

Dr. Hoffman was good enough to have one surface of each of the crystalline limestone samples polished, in order to give some idea of their value as marbles. They appear somewhat coarse-grained and not to yield a very superior polish. Generally speaking, there is nothing exceptional about any of the three. That from the bottom of the pit, presenting a rich grey-black polished surface, shot with zig-zag streaks of crystallized calcite, is the handsomest.

It will be seen from the foregoing that with a difference in colouring, the general composition of the rock is the same throughout. The great bulk of the rocks forming this portion of the Selkirk range (known as the Selkirk series) are nearly white and grey quartzites and grey to greenish-grey schists, the latter generally highly micaceous. In his report, W. S. Ayres speaks of finding in the old channel, where the Terror is situated, gravel consisting of quartzite of a dark brown and red colour. As dark coloured quartzites are here of very uncommon occurrence, the brown and red tints may have been the result of weathering. Some pebbles and small water-worn pieces of the same material were seen within Entrance No. 3, and had probably been carried there from the same source. Quartzite boulders were also noticed at other places in the interior of the Gorge series, but had doubtless been brought to them from a distance by the subterranean flood. Outcropping from the glacier overlaying the summit of Cougar pass, at the extreme head of Cougar creek, will be seen a mass of almost pure white quartzite, the fragments lying about in huge rectangular blocks.

The occurrence of limestone in the Selkirks is rare and, in the present case, is probably one of the crystalline beds found among archæan rocks (of which this portion of the range is almost entirely composed) and concerning whose origin there is considerable difference of opinion. The phenomenon of the caves is, therefore, due to the occurrence of a limestone deposit at this particular spot.

Subterranean waterways of a similar nature are the exception, not the rule, both in the Selkirks and the Main range of the Rockies. Even in the Main range, where limestone formation predominate, the writer, in ten years of surveys and explorations, is only aware of two other places where streams of any magnitude, leaving mineral springs out of the question, issue from underground passages, viz.:—the stream form-

SESSIONAL PAPER No. 25b

ing the source of the Amiskwi falls near the head of Amiskwi valley, west of Emerald lake, and Crownest river, near the summit of Crownest pass.

Mr. Ayres, who has examined the caves and reported upon them as an underground expert, puts forward the theory that these subterranean passageways have been formed entirely by water erosion and owing to a small stream of Cougar creek having first found its way, countless ages ago, through a shrinkage crack of some particular bed of limestone; and that they have, subsequently, been enlarged and made irregular in form through the process of disintegration. His reports, which are appended in full, are worthy of the deepest attention and consideration.

The writer, however, cannot but feel that, while the factors named have been largely instrumental in the condition of the underground channels and caverns as seen to-day, there has been at work an agency more potent and far-reaching than mere erosion and disintegration by the ordinary methods of nature.

From the point where Cougar creek first drops beneath Gopher bridge (Plate XI.), the old surface channel may be traced, though dammed and nearly obliterated in places. If the natural dam shown at the first point of entrance were removed, the stream would again revert to the old entrance. Southwest of the old entrance is a still older natural dam, whose removal would allow the stream to proceed to the Mill bridge; thence, following the ravine between the two camp grounds, it would pass directly across the Gorge, supposing that great rift not yet to exist, and flowing past Entrance No. 3, would descend in a cataract beyond Lookout point.

There is no doubt that these particular beds of limestone are badly shattered in the mass. It is shown by the fact that the surrounding streams; the Gopher falls, the periodical stream flowing to Entrance No. 3, and that of the Goat falls all join the main stream by underground ways. There are several other instances where the present bed of the creek could hardly be due to shrinkage and erosion, as in the case of the deep rift of the Gorge lying directly across the dip of the strata (the strata dip a little south of east, at an angle between 35° and 40°). The same thing is noticed in the subterranean bed of the creek from the east end of the Witches Ball-room to where it crosses the main corridor near the Art Gallery.

From October 16 to 21, last, during the survey made of the Gorge series by the writer (Plate XIII.), though it was well below zero at the camp in the woods, there was no frost found in the cave interiors at a short distance from the entrance. Thus, two of the highest factors of disintegration, sun and frost are lacking, when accounting for the wholesale cleavage that has taken place within the old waterways. The enormous size of the blocks, moreover, and the indication that the largest of them had been displaced a very long time ago would point to the agency of a severe shock or series of shocks such as would be caused by an earthquake or some similar seismic disturbance. That such disturbances have taken place and acted in this particular locality is borne out by other curious phenomena for which it is difficult to find a different explanation.

In 1904, Prof. W. H. Sherzer on behalf of the Smithsonian Institution of Washington, D.C., visited the Canadian Rockies for the purpose of studying their glaciers. Among a series of five, he made a special study of the Illecillewaet glacier, situated about seven and a half miles from the caves. At some distance from the present ice-tongue of the glacier, were found two moraines about a third of a mile apart, composed of enormous blocks of quartzite, weighing in some single instances as much as 1,250 tons and retaining the original shape in which they were cast from the peaks above to the snow-field and glacier transporting them to the place where they are now found. Prof. Sherzer has named these 'Block Moraines' in distinction to ordinary moraines composed of ice-worn rounded boulders imbedded in a species of cement, commonly known as boulder clay.

The question is: How and at what time were these block moraines formed? At the present day the glaciers are wholly incapable of transporting such a load and no such quantities of material are to be found upon the snow-field below the peaks as

6-7 EDWARD VII., A. 1907

would be necessary to form a similar moraine, even during a protracted period of rest on the part of the glacier.

In the endeavour to ascertain a date for their formation, Prof. Sherzer cut down trees growing between the two moraines and counted the rings of growth. The oldest was found to have an age of 550 years. Trees, also, growing on the inner or younger moraine were measured and the age of the oldest ascertained to be 447 years. Allowing for the time required for the collection of sufficient soil to permit of growth taking place, the moraine, therefore, would be between 500 and 600 years old.

Professor Sherzer points to the probability of seismic disturbances being the cause of these block moraines and that the material of which they are formed had been shaken from the peaks to the snow-field below. Making due allowance for the period of transportation of the material forming the inner moraine, the earthquake would thus have occurred during the thirteenth century. (See *Glacial Studies in the Canadian Rockies and Selkirks*, Smithsonian Expedition of 1904, by William Hittell Sherzer, Ph.D.).

That disturbances of this nature have taken place in Canada at a much more recent date is pointed out in the above report by the following quotation from the *Jesuite Relations*, Thwaites Translations, vol. XLVII., pp. 37-57; 183-223. 'On the fifth of February, 1663, towards half-past five in the evening, a loud roaring was heard at the same time throughout the length and breadth of Canadas. . . . On level ground, hills have arisen; mountains, on the other hand, have been depressed and flattened. Chasms of wonderful depth, exhaling a foul stench, have been hollowed out in many places, plains lie open, far and wide, where there were formerly very dense and lofty forests. Cliffs, although not quite levelled with the soil, have been shattered and overturned.'

If the origin of block moraines can be accounted for by seismic disturbances, it is not improbable to assume that at some remote date a similar occurrence has shattered this bed of crystalline limestone and precipitated Cougar creek from its surface course into subterranean channels, which, through the course of ages, it has enlarged to their present size, and that subsequent shocks have been mainly responsible for the large quantities of fallen debris that litter the interiors. Under such a condition of affairs, the crack of the Gorge and similar chasms found below the surface would be accounted for.

Extent.

The various cave systems, as far as they have been explored, are compassed within a surface distance of 2,910 feet, extending from the triangulation station near Gopher bridge entrance to the Wind crack below Lookout point. There are, however, two places along the bed of the stream below Douglas falls at which it seems probable that the subterranean flow comes to the surface. It is not unlikely that the system of underground waterways will extend to the more southerly of these two points, though probably on a very much smaller scale, and thus add a distance of 3,270 feet to that already given, or a surface distance of 6,180 feet altogether.

The total length of underground passageways as far as explored at the present date, is 5,550 feet.

From the first disappearance of the stream under Gopher bridge to the lowest point explored at the Bridal chamber, there is a fall of 411 feet and from the same point to the Wind crack 465 feet. Continuing on down the stream the fall from the point first named to the first place at which the subterranean flow comes to the surface is 946 feet, and at the second place 1,305 feet, while the total fall from the upper end of Gopher bridge to the railway track at Cougar creek tank is 2,016 feet.

Accessibility.

The Gopher bridge and Mill bridge series are easily accessible and by the addition of better made ladders, a little planking and some bridging, where necessary, can be made much more so.

SESSIONAL PAPER No. 25b

The entrance to the Gorge series, is entirely dependent upon the stage of water in the creek and is not accessible until, probably, the middle of August, by way of the Gorge. It appears to the writer, however, that the uncertainty of entrance dependent upon the flow of the creek may be overcome by opening up the Wind crack and making an entrance to this series from the lower end through the Bridal chamber and Judgment hall. The distance is only 240 feet, and the difference in elevation 54 feet. It will, also, be necessary to improve the passageways at a number of places by putting down planking and by opening out the narrow gaps. Judging by the very large quantity of rock debris lying in the several chambers and passageways, apparently caused to fall by a severe shock, or series of shocks, it would seem that blasting inside must be prohibited and that when enlargement has to be done, it must be performed by means of the cold chisel, drill and hammer.

The underground waterways comprising the Nakimu caves, and for the most part now in disuse, viewed in the light of an earthquake, are of comparatively simple origin. They are of exceeding interest, not only on account of the unexpected forms of the various chambers, passageways and potholes, but for the exceptional opportunities offered to study the crystalline limestone strata in their various phases and the erosive action of the prehistoric stream in conjunction with the sedimentary particles carried by it at flood stages of bygone days.

Apart from the caves themselves, the valley—one of an alpine type of special interest—is well worthy of a visit on its own account, and will be found to fully repay the visitor. There are few places in the Selkirks or, for that matter, in the entire mountain regions, where such a wealth of alpine flora, fauna, glacial and other high mountain attributes, not only does not require to be sought, but forces itself upon the eye of the observer with a persistence and beauty that will not be denied.

REPORT ON THE EXPLORATION OF DEUTSCHMAN CAVE.

By W. S. AYRES, *Mining Engineer.*

BANFF, ALBERTA, June 8, 1905.

THE PARTY.

The following persons left Revelstoke, B.C., by train on the morning of May 29, for Ross Peak water-tank, viz., H. Douglas, Supt. Rocky Mountains Park of Canada; W. S. Ayres, Mining and Mechanical Engineer, Banff, Alberta; J. P. Ford, Res. Engineer, C.P.R., Revelstoke, B.C.; A. Johnson, Managing Director Revelstoke *Herald*; R. E. Benson, Photographer, Revelstoke, B.C.; C. M. Field, Agent, C.P.R. Townsite, Revelstoke, B.C.; R. B. Bennett, Associated Press Correspondent, Vancouver, B.C.; A. McRae, Postmaster, Revelstoke, B.C.; C. R. Macdonald, Mgr. Can. Drug and Book Co., Revelstoke, B.C.; G. Lembke, Electrician, Revelstoke Water, Light and Power Co.; J. Hume, with C. B. Hume and Co., Revelstoke, B.C.; C. H. Deutschman, Discoverer of the Cave, Revelstoke, B.C.

On arriving at Ross Peak water-tank the party, led by C. H. Deutschman, at once proceeded to the cave, each carrying a pack consisting of tent, blankets, provisions or appliances and arrived at 5.20 p.m., after a most arduous climb along the steep mountain side, over rocks and snow slides and through a tangle of black alders.

The ascent was 900 feet above the Ross Peak water-tank and horizontally distant from it about 8,000 feet, corresponding to a grade of 14 degrees or nearly 25 per cent.

On the afternoon of May 30, all the party returned to Revelstoke except the following: W. S. Ayres, C. H. Deutschman, A. Johnson, R. E. Benson and C. M. Field.

6-7 EDWARD VII., A. 1907

During the afternoon of May 30 and the morning of the 31st Mr. Benson, photographer for Mr. Johnson, secured many photographs of the scenery about the cave.

On the morning of the 31st, Messrs. Johnson and Field returned to Revelstoke. Deutschman accompanied them as far as his cabin, near the water-tank and returned to the cave in the afternoon, with more provisions and one C.P.R. bridgeman to construct ladders, rafts, &c. Two were promised, but only one was at hand.

I have made a survey of the surface and of the portions of the cave that are now accessible and have prepared a map which is hereto attached.

EXPLORATION.

On the morning of May 30, the entire party entered the cave by the opening which I have designated on the map as 'Entrance No. 1.' Pools of water more or less filled with ice were encountered which greatly impeded our progress, and finally a very deep one, at a distance of 237 feet from the surface, barred further progress until a raft could be prepared. Retracing our steps to the surface we sought an entrance in the 'Canyon' by means of a rope. This passage was about 70 feet below the natural surface and about 100 feet above the bottom of 'The Canyon,' was very small and blocked with ice. I have designated this opening as 'Entrance No. 2,' on the map.

Another opening was found which is recorded as 'Entrance No. 3.' Here by crawling through a very narrow passage on hands and knees and then descending a steep narrow water groove for about 50 feet the brink of a very large cavern was reached that was estimated to be 256 feet deep, but its length and breadth were, owing to their great extent and to the insufficiency of lights at hand, inaccessible. It was observable, however, that several openings led off from this great cavern. The plunge and roar of a great waterfall somewhere down in the depths of this cavern reverberates in every inch of space and produces in the listener sensations so weird that even those that have elsewhere met its counterpart are at first startled.

No further attempt was made at this time to explore the cave through this entrance for the reason that the three hundred feet of rope sent by Mr. Ford, resident engineer of the C.P.R., for our use, had not yet been brought up to the cave from the water-tank. On the following day another obstacle presented itself. The rapidly melting snow formed a sudden rush of water which poured down the mountain side and into this opening, and made it not only inaccessible for the time being, but proved it to be positively dangerous to enter for any extended explorations until the snow has practically disappeared.

On the afternoon of May 31, and the forenoon of June 1, a raft and additional ladders were constructed to cross over the large pool that impeded our progress on May 30 in 'Entrance No. 1.' While we were eating our noon meal on the 31st, Cougar creek overflowed into this entrance. We made the attempt to descend but were drenched with water and our lights were put out. We constructed a dam to prevent this as far as possible, and at 6 a.m. on June 2 we again descended into the cave by this entrance and found at a distance of 331 feet from the surface a large square chamber 50 feet wide by 60 feet, that was accessible. A large portion of its length was inaccessible, owing to Cougar creek which flows across it, and to accumulated ice. We named this chamber 'The Auditorium.'

At a point in the main entrance just as we emerge from 'The Auditorium' a branch passage was found which again joins the main entrance about 100 feet from the surface. This branch passage is marked on the map as A-B. Another branch passage was found to connect this entrance with the surface and it is designated on the map as B-C. A diligent search in this part of the cave disclosed no other accessible openings.

A descent by ropes to the bottom of the canyon at 'Entrance No. 2' was considered but it was deemed entirely unsafe, owing to the very large accumulated mass of snow which might slide into it at any moment and without warning. Besides this no entry can be made until Cougar creek has subsided to a mere brook.

SESSIONAL PAPER No. 25b

The falls designated on the map as 'Lower Goat Falls' were visited with the hope that an entrance might be effected to the large cavern by the passage through which the water from the falls enters; but it was practically filled with water and ice. The falls consist of two vertical drops, the upper one is about 30 feet and the lower one 50 feet. A large amount of water is delivered into the cave from these falls, the place of entry being immediately at its foot. It is called 'Entrance No. 4.'

No other openings were discovered by which access might be had to the large cavern, and we are barred from entering it by those openings already described, and for the reasons given, until such time as the spring floods may have fully subsided.

As to the probable extent of the cave some remarks will be made under the heading of 'Rocks, Foundation and Extent of the Cave.'

ROCKS, FOUNDATION AND EXTENT OF THE CAVE.

The rocks in which the cave occurs are of very hard crystalline limestone, dipping about 30 degrees to the east. In 'Entrance No. 1' these beds are very thick and are made up of alternate bands of white, mottled and grey marble. Some of the bands are very highly impregnated with fine sharp sand, so much so, in fact, that excellent whet-stones can be made from them.

The cave has, undoubtedly, been formed entirely by water erosion. The stream which formed it, Cougar creek, is entirely made up of glacier and snow water, and above the cave is free from any lime salts. Its capacity, therefore, to dissolve lime-rock, when brought in contact with it, is at its maximum. The fine grains of sharp sand loosened from the lime rock and caught in the swift current of the small stream that at first found its way through a shrinkage crack of some particular bed of limestone, have undoubtedly given the water an uncommon erosive power, which through the countless years of the cave's history has enabled that mountain torrent to carve out a mammoth channel in solid marble.

The absence of all stalactites and stalagmites such as are usually found in caves, and the presence of curiously carved marble walls wonderfully carved in fantastic shapes and sombre colouring, suddenly make one realize that he is far removed from things familiar.

As to the probable extent of the cave a reference to the accompanying map will show the relative position of 'Entrances Nos. 1, 2, 3 and 4' and the distance between them. Also the location of the supposed outlet from the cave is about one-half mile south of 'Entrance No. 4.' The area between 'Entrances Nos. 1, 2, 3 and 4' and 'Upper Goat' and 'Douglas Falls' is probably a labyrinth of underground waterways. The one-half mile between 'Lower Goat Falls' and 'The Supposed Outlet' should be the largest part of the cave by reason of accumulated waters.

There may exist other lesser caves further north on the strike of the same limestone foundation.

No evidence whatever was discovered that any portion of the cave had ever been used as a habitation by any human beings such as Indians, or by wild animals such as bears or wolves.

LOCATION AND SCENERY.

The cave is situated on the west slope of the Selkirks, in British Columbia, at the head waters of Cougar creek, north about two miles from Ross Peak water-tank on the main line of the Canadian Pacific Railway, and west two and one-half miles from Glacier station. It was discovered October 22, 1904, by Chas. H. Deutschman, whose name it bears.

Mount Sir Donald and The Great Glacier are in plain view looking east from the cave. In fact they can be seen from here to a far better advantage than from the Glacier House.

Looking in the opposite direction, due west, the glacier forming Cougar creek is in plain view. We named it Grizzly Glacier, because a grizzly bear only a few weeks

6-7 EDWARD VII., A. 1907

ago came down over it on his way eastward, and disputed with Mr. Deutschman his right to invade the territory. The bear got away.

Following up the Cougar creek toward this glacier for a mile and a half from the cave, through a narrow valley with high mountains on either side, we came upon two little lakes, twins, covered with a spotless counterpane of snow and fed by the glacier itself.

On turning around to retrace our steps to the cave a view of Mt. Sir Donald and the Great Glacier greeted our eyes that can never be forgotten.

As we near the cave again we come upon a natural bridge under which Cougar creek flows for a distance of 350 feet. This bridge is called 'Gopher Bridge' on the accompanying map. Immediately north of this bridge are two cascades which start several hundred feet up the side of Cougar mountain and descend with many slides and leaps and join Cougar creek just below the bridge. These cascades have been named 'Whistler Falls' because of the great number of whistlers, Hoary Marmots, that have their burrows in the neighbourhood.

Passing down Cougar creek a hundred feet and turning back to look at the end of the bridge a beautiful scene meets the eye. The opening in the rocks out of which the water quietly and mysteriously flows, the snow-covered banks, the falls in the foreground make this a very attractive spot.

From Entrance No. 1 down Cougar creek to the west end of the second natural bridge is to be found a rare specimen of nature's handiwork. It is a water channel cut into solid rock with many round potholes in the channel and along its sides. For the first 160 feet the descent is very moderate but for the next 150 feet it is on the dip of the strata, which is 30 degrees to the east, and through a series of large and deep potholes joined by openings in their sides where the water plunges, whirls and roars until lost under the end of the second natural bridge. This channel has been called the 'Flume' owing to its resemblance to the flume of a mill.

The second natural bridge has been named 'The Mill Bridge' because immediately where the water enters under the bridge there is a roaring sound of a restless force such as is heard at many water wheels. The length of this bridge is 243 feet.

At the east end of the bridge Cougar creek emerges into a canyon about 170 feet deep, which continues for a distance of 234 feet, where it abruptly ends and where Cougar creek enters the cave. It is called 'The Canyon' on the map.

On the surface immediately to the east of this canyon are the beautiful waterfalls which I have named 'Bear Falls,' 'Upper Goat Falls' and 'Douglas Falls.' The latter is in honour of Mr. H. Douglas, Superintendent of the Canadian National Park.

The trees forming the forest about the cave are nearly all balsam firs, which create a spicy fragrant atmosphere peculiarly their own. They range in age from 150 to 250 years old, are tall and straight, and are perfect specimens of this attractive tree.

ACKNOWLEDGMENTS.

I desire to acknowledge the courtesies of Mr. T. Kilpatrick, district superintendent of the C.P.R., and J. P. Ford, resident engineer of the C.P.R., in furnishing some section men, some material and supplies, a bridgeman to assist in the construction of rafts and ladders, and in furnishing oil, ladders and ropes.

The above report is respectfully submitted.

W. S. AYRES,

Consulting Mining Engineer.

SESSIONAL PAPER No. 25b

SUPPLEMENTARY REPORT ON THE ADDITIONAL EXPLORATION OF
DEUTSCHMAN CAVE.By W. S. AYRES, *Mining Engineer.*

BANFF, ALBERTA, November 9, 1905.

On the morning of October 25 we, Deutschman and the writer, left the Glacier House on foot and arrived at the cave at 12.30 p.m., the distance being about five and one-half miles. The recent storms had deposited considerable snow, increasing from six inches at the Glacier House to four feet at the cave. As we approached the cave the deep snow, together with a crust buried about one foot beneath the surface, made the climb very laborious. In the afternoon we cleared the snow from our camp and broke trails to the upper or west end of 'Gopher Bridge' and to 'The Canyon.'

On the 26th, 27th and 28th we explored 'Gopher Bridge' and the main cave, entering the latter through 'The Canyon' and 'Entrance No. 2.' This exploration consisted of a complete survey of all passages, not heretofore reported by me as surveyed, and of flashlight photographs of some of the attractive features of the interior.

On the 29th we broke camp and returned to the Glacier House on foot.

THE TRAIL.

A very easy trail for riding or walking can be made from the Glacier House to the cave by way of The Loop and Ross Peak water-tank. The length of this trail would be about five and one-half miles. It would have not only an easy grade, but a location that brings to view in a new light some of the grandest scenery of this famous part of the Selkirks. This feature of itself would make it a very popular trail even though there were no cave at the other end of it.

On arriving at the cave the magnificent assemblage of balsam firs with their spire-like forms, welcome the visitor as stately hostesses. In the winter they deck themselves with the most dainty snowy drapery.

THE EXPLORATION.

The 'Gopher Bridge' was first explored. An entrance was effected by Mr. Deutschman during the summer, first, by crawling through a narrow passage in the old bed of Cougar creek, marked on the map herewith submitted as 'Old Channel,' and second by blasting away some fallen rock at a point noted on the map as 'Gopher Bridge Entrance.' We entered by the latter opening. This is a very unique cave by itself. The characteristic water-carved walls of white and grey marble, such as are found in 'Entrance No. 1' and described in my report of June 8, 1905, are everywhere to be seen. An additional feature, however, is here to be found. In many places the change of the limestone into marble is not complete. The parts of the rock not fully changed stand out as nodules, while the marble between them has been dissolved and eroded to an unusual degree, thus giving the walls a strange picturesque appearance.

From a geological standpoint the formation under 'Gopher Bridge' shows, in a manner rarely to be found in surface exposures, the various stages of transition of the original limestone into the present marble by the heat process called metamorphosis. There are evidences also of cavities, comparatively small it is true, that existed in the original beds of limestone and which were subsequently filled with pure carbonate of lime. During the metamorphosis of the limestone this filling was also changed to white crystalline marble. Some chips and nuggets of quartz are to be seen imbedded in the filling, evidencing that they were carried into the cavity by water during the process of the lime accumulation. Shrinkage cracks are everywhere to be found in the grey and white marble, which were formed during its early solidification into

6-7 EDWARD VII., A. 1907

limestone, and afterward filled with pure carbonate of lime. They now show as seams of white marble inserted in the rocks at various angles to their bedding faces.

Cougar creek now enters under 'Gopher Bridge' at the point marked 'Present Channel' on the map. In my former report, June 8, 1905, no reference was made to the 'Present Channel' because it was entirely obscured from view by a very deep snow-slide. The 'Old Channel,' however, was partly open to view, and, because of its logical position, was mistaken for the channel actually conveying the water under the bridge.

The creek has a tortuous course under the bridge, as is shown on the map. The first portion of it was inaccessible because of the low roof, the last portion because of the deep water in the creek.

The openings that were explored are now easily accessible, and it appears to be quite possible to form a continuous passage under the bridge by bridging the deep and swift portion of Cougar creek that is now impassable. If this is done the visitor would begin his tour of the caves by entering first at the upper or west end of 'Gopher Bridge.' Emerging at the east end he would again enter by 'Entrance No. 1.' At the southeast corner of the 'Auditorium' a passage can be made into 'The Canyon' by removing the debris for about 20 feet. Then the visitor can make a continuous trip from the west end of 'Gopher Bridge' to the large cave without retracing any steps.

A correction in my former map is made, on the accompanying map, as to where the waters from 'Whistler Falls' joins Cougar creek. In June last this junction was partly obscured by a heavy snow-slide, in fact the waters from the falls were then running as shown on my former map. After the snow disappeared it was discovered that they join Cougar creek under 'Gopher Bridge' and disappear from the surface in a deep, nearly vertical shaft, called 'The Gopher Hole.'

The exploration of the main cave through 'Entrance No. 2' was a most laborious task. The descent into 'The Canyon' was by means of a rope down an incline that was nearly perpendicular, about 75° , and over snow and ice, for a distance of 85 feet. The cave was then entered by 'Entrance No. 2.'

Cougar creek at this time was very much less in volume as compared with its flush condition at the time of my former report, June 8, 1905, and fair progress in the exploration has been made. A complete survey of all its accessible openings was made, and the accompanying map shows them in their relative positions.

This main cave comprises the largest of all the underground openings thus far discovered. It naturally should, because of the additional waters entering it. The average height of the main channelway, measured on the dip of the strata, is about 100 feet, while the width, measured perpendicularly to the bedding faces, ranges from 8 to 20 feet. This channelway is not, as might be supposed, of uniform width, but varies with the conditions of flow of the water at the time of its formation. With all the water flowing through it on a steep grade it would be narrow, and with only a portion of it, the other portion running round some other way, it would also be narrow. It would be widest where all the water passed through it and on a moderate grade.

During its earlier history it undoubtedly appeared much like the passageway in 'Entrance No. 1,' described in my report of June 8, 1905. But as the channelway grew deeper and wider, through centuries of erosion, many large masses of rock from the hanging-wall were loosened and fell into the channelway, thus causing an obstruction, around which the water cut its way, and at the same time cut away some or all of the obstruction itself. As a result many enlarged places are to be seen here and there. Still others are to be seen that have been formed as potholes, like rounded shafts, down which the water poured keeping the boulders at their bottoms ceaselessly grinding them deeper and deeper.

From these results it was only a matter of time when, particularly at the confluence of streams, great masses of overhanging rock would be unfooted and dropped into the great channel and potholes. This is shown to a marvellous degree where the waters of 'Bear Falls' formerly joined Cougar creek. Portions of the old channelway and of the very large potholes are here visible, the other portions being covered

SESSIONAL PAPER No. 25b

with fallen rocks from the roof. One of these, an enormous rock, rests in a nearly horizontal position and its upper surface contains about 1,200 square feet of floor space. This we named 'The Ball Room.'

About 150 feet south from 'The Ball Room' is 'The Pit.' This is the 'Deep Cavern,' at 'Entrance No. 3,' mentioned in my report of June 8, 1905, 'that was estimated to be 256 feet deep.' This estimate was made from the number of seconds required for a stone to reach the bottom. It took four seconds, but several deflections were made by the stone in its descent. The nearly vertical portion of 'The Pit' measures 120 feet, and the steep channelway leading from its bottom and down which the stone undoubtedly went, measures 125 feet more, making 245 feet by actual measurement. The rocks in 'The Pit' are of a very dark blue-grey colour and have bands of white marble inserted in them which have been crumpled by pressure, giving the bands a zig-zag appearance.

The fallen masses of rock wherever found throughout the cave, particularly those about 'The Ball Room' and 'The Pit,' were carefully examined to determine their present stability. The roof was also examined carefully to the same end. The singular firmness of every fallen piece, even the small ones, led the writer to the discovery that the water had undoubtedly shifted all the fallen pieces, great or small, into positions that are firm and reliable. No evidence whatever was discovered of any present movement in the roof, neither were any points discovered where the present water erosion has made a fall of rock imminent.

To make travel easy in the cave plank walks should be built across these rough places. No blasting of any kind whatever should be allowed in any part of the cave in forming passageways or in making any improvements. The present quiet condition of the rocks is thereby ensured, and the breaking of the fragile carbonate of lime coating, which forms the decoration of the cave, by the concussion of blasting, is also prevented. A blast might work ruin to this attractive feature.

At a point on the main passageway nearly opposite 'The Pit,' and marked 'A' on the map, an opening was found through which we descended to the present bed of Cougar creek at the bottom of the cave. This passage led us north directly under 'The Ball Room,' where an examination was made of the bottoms of the gigantic potholes now in ruins, and of the old water-grooves. We naturally named this spot 'The Old Mill.' It certainly did grind for many centuries before it fell into ruin and disuse. Passing still farther along this passage in a northerly direction we came down upon Cougar creek. Following up the creek to the point marked 'B' we discovered that it here makes a sudden turn to the northwest. Continuing up the creek we came to a place where the low roof and accumulated gravel prevented further progress. This point is only about 200 feet from where Cougar creek disappears near 'Entrance No. 2.' Returning to the point 'B,' we continued on in a northerly direction and found a different kind of gravel and boulders in the bed of the channel. In Cougar creek above the point 'B' it consists of marble and schist with very little quartzite which is chiefly white or light in colour. But in this branch channel quartzite of a dark brown or red colour constituted almost the entire gravel. The same gravel had been observed at 'Bear Falls' and the inference was at once drawn that this was formerly the inlet passage from these falls. From the map the proximity of these falls to this passage makes the inference almost conclusive, yet further exploration is necessary to make it positive, for it can as well be the inlet from 'Upper Goat Falls.' Continuing to the northward we came to a sudden turn to the right, beyond which the most ragged walls are to be seen that have been found anywhere in the cave. The jagged points and grotesque shapes at once inspire caution. It was named 'The Terror.' Its peculiar roughness is due to the partial metamorphosis of the rocks, and is similar to the condition of change found in the rocks under 'Gopher Bridge.' In this case the condition is accentuated by the existence of thin knife-like blades of the unchanged limestone instead of nodules, all of which extend from one-half inch to two inches beyond the general surface of the marble holding them. The extreme south end of this inner passage rises suddenly for about 15 feet and a ladder is needed to

6-7 EDWARD VII., A. 1907

explore it beyond this point. This is the present water-course. The extreme north end opens out into a large chamber that is practically filled with sand and gravel. Several branch passages are to be seen extending north and south from this chamber, but they are nearly filled with gravel. They all enter it near the roof.

From this chamber to the point A this passage has been formed along a fault, which inclines upward at an angle of about 65° to the west. Along its line on the surface the ravine of 'Bear Falls' has been formed, also the depression through which its waters now flow to 'Entrance No. 3.' From this entrance down into the cave these waters have cut their way along this same fault, joining Cougar creek below, and in their passage have formed 'The Pit.'

This portion of the cave just described from A northward and downward along Cougar creek to the limits mentioned and the passage from B to 'The Terror,' had never before been explored until Mr. Deutschman and the writer entered it on October 27, 1905. It is one of the most interesting and instructive portions of the entire cave. It tells a long story in history from its grinding of 'The Old Mill' to the present day erosion, probably more than 40,000 years.

Returning to the point A, and continuing along the passageway, which from here runs in a southeasterly direction along the strike of the strata, many interesting features are met with.

From the map it will be observed that those sections of the highest old waterway thus far thoroughly explored and surveyed, from 'Entrance No. 2' to the present southeasterly limit of the cave, are all on a line and that this line is coincident with the strike of the strata. The omitted sections of it that lie on either side of 'The Pit' have been explored sufficiently to determine that they are on the same line. They are so nearly filled with debris as to be unattractive. The fact that this old waterway was originally straight and continuous along the strike of the strata, and passed close to 'The Pit,' forms a base from which to study the subsequent changes.

At a point about 190 feet forward from A, a passage to the left exists that leads to the brink of a precipitous rock at the foot of which Cougar creek can be seen dimly. This place had already been named 'The Turbine' by a previous visitor. There is a roar and swish of falling water to be heard here. Undoubtedly the roar mentioned in my former report as heard in 'The Deep Cavern' came from these falls, whose roar, when Cougar creek is highest, is thrilling beyond description.

A search was made here for a way to get down upon the bed of Cougar creek both above and below the falls. Above the falls the passageways shown on the map were found and the creek explored and surveyed for the distance shown. Below the falls a crevice in the rocks was found through which we descended to the present creek bed. The course of Cougar creek here is diagonally to the right across the strata, and its level is about 60 feet below the passageway by which we advanced. In the old channel-way on this lower level are to be seen two very large potholes 18 feet in diameter. One of them, with an arched roof about 40 feet from the bottom, is decorated in a most beautiful manner with carbonate of lime accumulations. Standing at the bottom, and looking up, a most beautiful sight greets the eyes. It was at once named 'The Dome.'

All progress in a southeasterly direction along Cougar creek beyond the point represented on the map was barred by a very low roof at one place, and at another by the steep descent and swift current of the creek itself.

This portion of the cave above and below the falls, or 'The Turbine,' is also a section that had never been entered before Mr. Deutschman and the writer entered it on October 28, 1905. In fact the first exploration of the bottom of this cave at any point, and the location of Cougar creek running through it, is here recorded.

Passing on in a southeasterly direction from the point A for a distance of 250 feet, an old water-course is entered that we named 'The Art Gallery' because of the beautiful deposits of carbonate of lime. This lime accumulation is white or creamy white with an occasional tint of pink. It resembles heads of cauliflower set close together without intervening space, and in mass is very beautiful.

SESSIONAL PAPER No. 25b

From 'The Art Gallery' forward for 200 feet several more spots with lime accumulations are to be seen.

Immediately after passing the southeast end of 'The Art Gallery' a waterway on the right was observed, but it was inaccessible except a short distance owing to its almost vertical ascent and to its narrowness. This may be the inlet from 'Entrance No. 4' which is 'Lower Goat Falls.' This is not positive, however, as a passage was observed branching off from the loop of Cougar creek at 'The Turbine.' The writer thinks the latter the most probable inlet from 'Lower Goat Falls.' This inlet at 'The Turbine' was not explored as a ladder was needed.

From the waterway on the right, just beyond 'The Art Gallery,' our course was down over large masses of fallen rock for a distance of 300 feet, then turning to the right and still continuing down through a narrow passageway for a distance of 100 feet more, we entered a beautiful opening or room which we called 'The Bridal Chamber.' The decorations of carbonate of lime are creamy white and very dainty. This room is formed against a fault, showing that Cougar creek was here deflected by it to an easterly course.

No way of getting down to the present bed of Cougar creek at this point, without ladders, was discovered. The roar of water plunging down a steep incline could clearly be heard, and it is assumed that the creek continues along this fault for some distance. We were greatly disappointed in not being able to descend to its bed, as this seems to be the only avenue of entrance to the openings that unquestionably exist between 'The Bridal Chamber' and where Cougar creek emerges to the surface. Just where the last point is we have been unable to determine, as no sufficient outflow of water has thus far been found on the surface to positively locate it.

Immediately over 'The Bridal Chamber,' about 125 feet above it, exists the extreme southeasterly end of the oldest waterway in the cave, and which has already been described as partly in ruins. Owing to its original continuity in a straight line for 1,000 feet, and its broken condition, we have named it 'The Ruined Aqueduct.'

After ladders have been prepared and put in place, at the points mentioned as necessary, the exploration can be continued. No further attempts were made at this time to effect an entry.

A small chamber exists directly over the north end of 'The Canyon' which was explored in September by Mr. Deutschman and named by him 'The Ice Cave' because the ice remained in it during the entire summer. This opening is mentioned in my former report as blocked with ice, and was then designated as 'Entrance No. 2,' believing that it connected with the cave below. In this report 'Entrance No. 2' means the entrance on the bed of Cougar creek, at the bottom of 'The Canyon,' 100 feet perpendicularly below this opening. This 'Ice Cave' consists of a narrow passage about 80 feet long at the end of which is a chamber 20 by 40 feet, with two branch passages leading from it, each about 100 feet long.

An opening in the ravine 1,700 feet in a southeasterly direction from the most southerly point of the bluff was recently discovered by Mr. Deutschman, and we next proceeded to it. We were able to enter it for about 75 feet only when the passage branched and became so small that we could go no farther. This opening, while it may prove to be local and in no way connected with the main cave, causes the writer to believe that there are great possibilities still existing as to the extent of the main cave.

A few stalactites were found here and there in the old parts of the main cave, pure white in colour, the largest being 18 inches long.

EXTENT OF CAVE.

The prediction made in my former report that 'The area between Entrances Nos. 2, 3 and 4 and 'Upper Goat' and 'Douglas Falls' is most probably a labyrinth of underground waterways,' has been almost fully verified, the only portion not yet entered

6-7 EDWARD VII., A. 1907

being the triangular space between 'Upper Goat Falls,' 'Douglas Falls' and 'Entrance No. 4.'

From the conditions now known it is only logical to believe that extensive openings exist in this area. The prediction also that 'The one-half mile between 'Lower Goat Falls' and the supposed outlet should be the largest part of the cave by reason of accumulated waters,' has been verified in greater part. That a very extensive cavern exists in this area, beyond that already explored and shown on the map, is a foregone conclusion.

The total length of the passageways surveyed and measured by the writer thus far amount to about 4,000 feet, or four-fifths of a mile. To see the caves at this time, before any improvements are made, the visitor must retrace his steps in every passageway, thus doubling the distance named. He must travel 8,000 feet, or one and three-fifths miles on the main passageways. This does not include the distance between the entrances nor the little side trips that will be made here and there in the cave to get closer to the various points of interest. The distance to the cave is now so great that it will require the visitor to be a person well used to climbing in order to view the entire cave in one day.

PROBABLE AGE OF CAVE.

The marble rocks in which the cave is formed belong most probably to the Devonian age. No fossils were found, however, to positively verify this conclusion. The limestone rocks have not been completely changed into marble at all points as was observed under 'Gopher Bridge' and in 'The Terror.' Notwithstanding the fact that the rocks belong to a comparatively old series, yet the beginning of the cave undoubtedly dates from a very recent geological time.

Assuming the rate of erosion to be one thirty-second of an inch in a year, then to cut down one hundred feet of rock, which is about the average amount eroded in the main cave, would require 38,400 years. Any actual rate greater or less than this assumption would increase or diminish the age of the cave. In several places along Cougar creek in the bottom of the cave an excellent opportunity is afforded to determine actually the present annual rate of erosion. A micrometer measuring apparatus should be used and the area of cross-section of the rock eroded per year thus accurately computed. Also the ratio between the area of the cross-section of the average stream and the area of the rock eroded should be determined. And finally, the quantity of water passing the given section in one year, and its velocity, should be accurately measured.

In contemplating the foregoing suggestion as to the probable age of the cave, it should be borne in mind that where gravel and sand lodge in the bed of the stream the rate of erosion is many times less than where the bed is continually swept clean by a more rapid current.

The above report is respectfully submitted.

W. S. AYRES,
Mining Engineer.

SESSIONAL PAPER No. 25b

APPENDIX No. 42 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF W. THIBAudeau, C.E.

SURVEY OF THE KLONDIKE REGION OF THE YUKON TERRITORY.

OTTAWA, CANADA, February 28, 1906.

To the Honourable
The Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit to you for consideration the following report of observations made by me under instructions of the Surveyor General in connection with the project to supply the Klondike Mining District with a complete water system for hydraulicking and sluicing purposes. Accompanying this report is a map showing the location and profile of the proposed system, which was prepared by me after running about 300 miles of contour and traverse lines and levels.

My work in this connection was begun on June 11 last, and was carried on continuously until October 1 following. With my interim report thereon, to the Surveyor General, dated October 16, last, I forwarded the following papers:—

1. Sketch map of the Klondike mining district and of the Klondike river, showing proposed location of the water supply, and general distribution of same.
2. Topographical map of the Klondike mining district on which is shown by red lines the elevation at which a water supply from the proposed tunnels Nos. 1 and 2 could be brought through the mining district.
3. A cross-section of Flat creek, showing one of the proposed crossings of the main conduit.

The proposed water system is to supply the Klondike mining district with 15,000 miners' inches of water, or 22,500 cubic feet per minute.

I would divide this report on the proposed main conduit route between the head of Six Pup (a tributary of Hunker creek) and up the main Klondike river, into two sections, as follows:—

Section 1.—This would run from the head of Six Pup to the head of Simplon creek, a distance of 36.08 miles, composed of one tunnel $1\frac{1}{4}$ miles long, two steel pipes, each 2,950 feet long, and 34.28 miles of canal, the water through the canal not to exceed a maximum velocity of 2.7 feet per second. This section would be through a dry country, well exposed to the sun, with a general slope of from 6 to 8 degrees, except about $1\frac{1}{2}$ miles at the head of All Gold creek; one-half mile at the head of Vanderbilt creek; $1\frac{1}{2}$ miles at the head of Minnie Bell creek, and $1\frac{1}{2}$ miles at the head of Simplon creek, and at these points the general slope is from 15 to 25 degrees.

No. 1 tunnel for distributing water into the Klondike watershed would be 8 feet by 10 feet and 6,600 feet long, running through deformed quartz-porphyry. There is no indication that the work would be hindered by water during construction. On the upper end of the tunnel a cut would be required of 300 feet, averaging 10 feet in depth, at which point I believe solid rock will be reached. The rock exposure is serpentine and deformed quartz-porphyry. I did not notice any rock in place along this route, except on the right limit of All Gold creek, where porphyry rock is exposed on a steep slope from the bottom up to a height of 400 feet. At the head of Simplon creek on the left limit for half a mile there is loose broken granite in blocks of from 50 to 150 pounds in weight.

The soil of this section is for the most part yellow loam, sand and gravel, and is not frozen except at the head of Leotta, Minnie Bell and Simplon creeks, on their right limits, where the slope is about 20 degrees. At these points the ground is frozen for

6-7 EDWARD VII., A. 1907

about 2 miles, and covered with thick moss. This ground, after being stripped of the moss and left exposed to the sun for about six weeks, will be found to be thawed. In Nome district it is customary in such cases to pile the moss on the upper bank, and when the ditch is finished, to replace it on each side of the slope. This keeps the ground from thawing over again and sliding.

This section is cut by many creeks, and is not exposed to washouts. Where the conduit would not cross the creek by syphon, it would cross well up to the head of the creeks. There is at no time a large enough quantity of water in the creeks to cause a washout of the ditch. The country through this section is partly open, and partly covered with dry spruce of 6 inches to 8 inches diameter, with small green spruce and willow, and a few large green spruce which escaped the forest fires that swept through and destroyed nearly all the timber some years ago. The nature of the soil throughout this section is very well adapted for making good canals and wagon roads, and the banked up slope will stand at a high angle. The maintenance would be easy and inexpensive.

Section 2.—This would run from the head of Janson creek (a tributary of Dominion creek), up the main Klondike river for a distance of $66\frac{1}{2}$ miles, composed of one tunnel 1.56 miles long, 2 steel pipes each 11.78 miles long, and 53.16 miles of canal, the water through the canal not to exceed a maximum velocity of 2.7 feet per second.

This section would also run through a very dry country, well exposed to the sun, with a general slope of from 4° to 6° to double syphon No. 3, and from 8° to 10° to the intake, except for 4 miles south from double syphon No. 4, and the head of other gulches which reach about 3 miles, where the slope would be about 22° . About $3\frac{1}{2}$ miles of this section is frozen, and covered with thick moss; the section as a whole is very dry and not exposed to washouts; in particular that part between double syphon No. 2 and for 3 miles above double syphon No. 3, and from double syphon No. 4 to 4 miles above double syphon No. 5, is the finest country I ever saw for a ditch.

Tunnel No. 2 for distributing water into the Indian river watershed would run from the head of Janson creek to the head of Simplon creek, and would be 8 x 10 feet and 8,300 feet long through deformed quartz-porphyry. On the route of this tunnel also there is no indication that the work would be hindered by water during construction. At both ends of the tunnel there would be cuts of 400 feet and 500 feet long respectively, and each of which would average from 6 feet deep at their lower end to 20 feet deep at their upper end. At these two points, it may be necessary to drive the tunnel through gravel or other material before solid rock is reached. These two cuts would be through frozen muck and silt; on these two cuts, with the moss stripped from the ground and both creeks diverted to the upper ends of the cuts, the water, attended by three or four men, would itself do the greatest part of the excavation work in a few weeks.

There is very little rock exposure in this section; such as there is, consists of carboniferous black slate much shattered.

On the steep slope south of the double syphon No. 4 and north of double syphon No. 5 to the intake I would expect to find solid slate after excavating a few feet. For a distance of 2 miles, on account of the soft and shattered condition of the slate, comparatively little blasting would be required.

On the right limit of Simplon creek there is loose rock-deformed granite for about half a mile.

On the line of double syphon No. 2 there is a decomposed granite rock exposure from Flat creek up the left limit for 700 feet or 800 feet on a slope of about 35° . On the right limit about 800 feet from the creek there is a porphyry rock exposure up hill for about 400 feet, and also in double syphon No. 4 on the left limit of the Klondike, there is a black slate rock exposure on a steep slope of 35° for a distance of 300 feet to 350 feet long, rising to an elevation of 2,400 feet. The country through this section is partly open, partly covered with dry spruce, willow and aspen. Some years ago this country was swept again and again by forest fires.

SESSIONAL PAPER No. 25b

SOURCE OF SUPPLY.

At the proposed intake for $1\frac{1}{2}$ miles above and 2 miles below, the river bed averages 120 feet wide ; above this point there is plenty of timber to build a dam in crib form, and there are also plenty of boulders from 50 pounds to 100 pounds to fill crib.

The width of the Klondike at double syphon No. 4 is about 150 feet and at Flat and Hamilton creeks from 50 to 55 feet. On the proposed route there is very little water to be picked up to take the place of percolation and evaporation without building long ditches, but the ground along the line, being loam, silt, sand and gravel, forms a good combination for a tight canal. The creeks, O'Brien, Australia and Hamilton, at an elevation of 2,650 feet have a combined capacity of over 6,000 miners' inches at lower state of water. Their watershed is larger than the north fork and could be diverted to the main ditch, if required, at a reasonable cost. Many people who have not been on the ground are under the impression that the greatest part of the line would consist of flumes or pipes, and would follow the north side of the hills, which they believe to be loose rock unsuited for ditching, or a mass of frozen moss or muck equally bad. But as a matter of fact there is very little loose rock there, and when the ground is excavated for 2 or 3 feet it is found to be mixed with sod, and forms a good bottom foundation. I have located over 1,000 miles of government road in every part of the Yukon, and when not located in creek or river bottom, I never found a section of it where the frozen ground would exceed eight per cent ; and I must say that the country above described is just as good for a canal or for a wagon road as I have seen in any part of the Yukon.

As to the statement that the water must be taken from a source high in the mountains, and then will not begin to run till late in the spring, and will freeze early in the fall, I may say that my party and myself left the proposed point of intake about the 20th of September, and up to that time there was no frost to stop water running in small creeks. But when we arrived at All Gold and Hunker creeks on the 25th of the same month, mining operations had been stopped for some days. My experience confirms the view that the creeks which are narrow and deep will freeze earlier and thaw later than ground at an altitude of 600 or 800 feet higher on an easy slope well exposed to the sun.

I have reckoned the time required to build the proposed water system, as follows:—

It will require from twelve to eighteen months to deliver the steel plates in Dawson from the time they are ordered. The following winter they could be hauled and distributed along the line, and the next summer they could be put together ready for operation. The roads, canals, &c., could be built in from one to two summers. I believe that the excavation would not be deep enough for steam shovels to be used ; ploughs, scrapers and road graders will have to be used.

I have made the necessary track survey with the use of Mr. Johnson's topographical map of the Klondike Mining District to prepare an estimate cost of the proposed system of distribution.

I append to this report the following statements, estimates and details :—

1. Detailed estimate of cost of double syphons and canals.
2. Estimate of cost of tunnels.
3. Detailed estimate of cost of proposed system.
4. Estimate of cost of distribution for Klondike river watershed.
5. Estimate of cost of distribution for Indian river watershed.
6. Comparative table of cost of maintenance of water conduit.
7. Comparative price of water per miner's inch.
8. Statement showing variation in duty of a miner's inch.
9. Opinions as to the utility of hydraulicking creeks.
10. Details of syphons on main conduit.
11. Details of proposed distribution by syphons on Indian river watershed.
12. Details of proposed distribution by syphons on Klondike river watershed.

6-7 EDWARD VII., A. 1907

13. Comparative table of hydraulicking operations in the Yukon Territory and Alaska.

14. Report and comparative data on cost of various methods of mining in the Klondike by John A. McDougal.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

W. THIBAudeau,
Civil Engineer.

DETAILED ESTIMATED COST OF DOUBLE SYPHONS AND CANALS.

The pipes to be built of high grade open hearth malleable steel, plates having an ultimate tensile strength of 60,000 pounds per square inch; these pipes are designed on a factor of safety of 3, with standard lap joints made up in parallel courses alternately inside and outside, each course to be not less than 6 to 7½ inches in width.

The longitudinal seams to be double riveted and the circular seams single riveted.

All pipes to be thoroughly caulked and all shop rivets driven by hydraulic power.

The weight given includes 10 per cent additional for laps, rivets and slip joints, air-valves, man-holes, coating of asphaltum, &c.

The pipe to be cut, punched and formed only and nested for shipment to Dawson. A plant to be established in Dawson or on the ground.

Cost of plates, manufacturing the pipes, &c., coated by immersing it in a hot bath of asphaltum preparation before laying ready to be used....	5 cents per lb.
Freight to Dawson....	2 "
From Dawson to their destination....	1½ "
	<hr/> 8½

All these pipes could be freighted to Dawson during the dull season of navigation, which is July and August. The freight from Dawson to their destination is on a base of ½ a cent per pound, per 20 miles haul. This winter some freighters are freighting from Dawson to Gold Bottom and Dominion on these bases. Cost of canals is on a base of 50 cents per cubic yard, for earth work excavation; wages \$5, and board per day; rock work fairly solid per lineal foot, \$1.75. Schist in place per cubic yard, \$1.25.

The computed velocity V for siphons or pipes is from treatise of Hydraulic and Water Supply Engineering, J. T. Fanning, page 271d.

Formula G. V .

v . = Velocity

h . = Head in feet

l . = length.

$$V = \frac{(d^{1.42} h^{.512})}{(.000492l)}$$

For canals from Kutters formula.

v . = velocity

r . = hydraulic mean depth

i . = inclination

n . = coefficient of roughness = .03

SESSIONAL PAPER No. 25b

$$v = \left\{ \frac{41.6 + \frac{1.811}{n} + \frac{.00281}{i}}{1 + \left(41.6 + \frac{.00281}{i}\right) \times \frac{n}{\sqrt{r}}} \right\} \sqrt{ri}$$

The computed thickness of pipes or syphons is from 'Mechanical Engineers Pocket Book,' by William Kent, page 707.

p. = safe working pressure in pounds.

d. = diameter in inches.

T. = Tensile strength of the material in pounds per square inch, 60,000 pounds.

t. = thickness in inches.

f. = factor of safety = 3.

c. = ratio of strength of riveted joint to strength of solid plate = .70.

$$t = \frac{fpd}{2Tc}$$

$$t = \frac{3pd}{2 \times 60,000 \times .70}$$

ESTIMATED COST OF TUNNELS.

Tunnel No. 1 and 2 to be 8 x 10 feet to be driven with air, through deformed quartz porphyry and porphyrites, estimated cost \$35 per foot. At Juneau a 9 x 10-foot tunnel, 3, 300 feet in length was driven through a spur of the mountain from the bank of Gold creek to top of the gravel pit at the proper depth for reaching the lowest sag in the bed rock.

It was driven with air at the rate of 8 feet per day in slate at a cost of \$20 per foot. No timbering was used with the exception of a few sets near the ends; labour \$5 per day.

AT NOME.

Between Snow gulch and Glacier creek a tunnel 1,800 feet in length has been run through the divide to carry the ditch water. Its dimensions are 4 x 6 feet, and it is timbered in places. It was driven through limestone at a cost of \$10 per foot. The top of the tunnel is level with the top of the water on the entrance side, the bottom of the tunnel being run at a low level so as to completely fill the tunnel. All the rock work in the tunnel was done by hand drilling and in the winter. The rock was found to be frozen 90 feet vertically below the surface.

CALIFORNIA.

LENGTHS, Grades and Cost of Important Tunnels in Nevada County.

Name of Mine or Tunnel	Locality.	Length of tunnel.	Average grade per sluice box.		%	Cost.
		Feet.	In.	Ft.		\$
Boston.....	Woolscrip Flat.....	1,600	10½	to 12	7½	40,000
North Bloomfield.....	Humbug Canyon.....	9,200	6½	to 12	4½	528,000
American.....	Below San Juan.....	5,000	10½	to 14	6¼	160,000
Manzanita.....	Sweetland.....	3,500	7	to 14	4½	92,000
Sweetland....	Cr. Sweetland.....	2,200	8	to 14	4¾	90,000
Bed-rock.....	Below Sweetland.....	4,400	9	to 14	5¼	75,000
French Corral.....	French Corral.	5,048	8	to 14	4¾	190,000

ESTIMATED COST OF PROPOSED WATER SYSTEM.

CAPACITY 15,000 MINER'S INCHES.

Estimated cost of main conduit.....\$4,876,077 10

Distribution.

Klondike water shed to Bonanza city... 437 169 00
Indian river water shed to opposite Australia creek.. 218,499 35

\$5,531,745 46

Contingencies, 10 per cent.... 553,174 54

Total....\$6,084,920 00

Assuming the life of the plant to be 20 years. Allowing 120 days each season actual working time.

Interest at 3½ per cent....\$ 212,951 20
Annuity required to redeem \$6,084,920 in 20 years at 3 per cent.. 226,483 70
Maintenance of main conduits, section 1, 67 miles at \$600.... 40,200 00
Maintenance of main conduits, section 2, 36 miles at \$500.. 18,000 00
Distribution conduits, 95 miles at \$400.... 38,000 00
Superintendence, &c.. 15,000 00
Contingencies, 10 per cent.... 11,120 00

\$ 561,754 00

Cost of water per working day....\$4,681 28

Cost per miner's inch.... 0 31½

(Assuming 6 cubic yards per miner's inch.)

Cost per cub yard.... 0 05½

(Assuming selling price of water at 35 cents per 24 hours per miner's inch.)

15,000 miner's inches at 35 cents=\$5,250 per day.

120 days at \$5,250....\$ 630,000 00

(Picked up water with pressure to 250 feet head.)

2,000 miner's inches—Hunker creek.
2,000 miner's inches—Bonanza creek.
2,000 miner's inches—Dominion creek.

6,000 miner's inches at 15 cents per miner's inch per 24 hrs. at \$900.. 108,000 00

Annual revenue... 738,000 00

Expenses.... 561,754 90

Profits and loss...\$ 176,245 10

This plant would pay for itself in about twelve years.

This plant will bring water above all claims and bench gravel deposits over an area of 550 square miles, and could be extended to all the placer claims on the watershed of Indian, Klondike and Yukon rivers tributary to the Klondike mining district.

SESSIONAL PAPER No. 25b

ESTIMATE OF FLOW OF THE KLONDIKE RIVER ABOVE PROPOSED INTAKE.

The watershed of the main Klondike river above the intake is about 425 square miles. The mean annual rain fall at that point is not known, but we have the annual rainfall for Dawson from 1902 to 1905, as follows :—

Year.	1902.		1903.		1904.		1905.	
	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.
January.....			5.				5.	
February.....			13.5		12.		13.	
March.....			6.				10.	
April.....			7.		1.	.68		.71
May.....				.39		.66		.20
June.....	48.5	8.85		.44	5.	1.31		.14
July.....				1.28		2.47		
August.....				1.37		1.86		3.55
September.....				2.31	3.	1.00	2.	3.18
October.....			12.5		3.	.06	13.5	.10
November.....			4.5		6.		11.	
December.....			6.5		14.5			
Total.....	48.5	8.85	54.5	5.79	44.5	8.04	54.5	7.88

Authority—Inspector of Fisheries, Yukon Territory.

As will be seen the amount of rain and snowfall does not vary much for different years, but very much for the same month. The average for the last four years is 12:69 inches. In the winters of 1899 and 1902 I was up to the head of main Klondike and both times I found that there was about three times more snow there than in Dawson, and from hunters and prospectors I am informed that there is more rain up in the Klondike than in Dawson.

I believe it would be on the safe side to assume the average amount of rain and snow fall to be 30 inches. The ratio of the three years low rain cycles give their mean rainfall at about $\frac{1}{10}$ of the general rainfall. The mean annual flow of the stream we assume to be 50 per cent of the annual rainfall and $\frac{1}{10}$ of 50 per cent gives 40 per cent of the annual rainfall as the annual available flow of the stream and 40 per cent of the 30-inch rainfall gives an equivalent of 12 inches of rainfall flowing down the stream annually.

The average flow is equal to 53:7563 cubic feet per minute per square mile, and for 425 square miles, 22,845 cubic feet per minute, or 15,222 miner's inches at lowest state of water. I have measured the flow of the Klondike river at a point about 3 miles below the proposed intake. I measured a base of 300 feet long, where the river appears to be uniform; the cross-section multiplied by the mean velocity of three floats, and the product multiplied by f. 95 gives 36,000 cubic feet per minute, or 24,000 miner's inches. At the time I made the measurement I was under the impression that the river was at its lowest stage, but now I believe it must have been soon after some rain-fall at the head of the Klondike river, which I did not suspect.

I also measured the flow of South Fork river, at an elevation of 2,600 feet. Above that point the watershed is about 150 square miles. The measured flow of the South Fork at that point was found to be 6,000 miner's inches.

6-7 EDWARD VII., A. 1907

ESTIMATED COST OF A PLANT OF 10,000 MINER'S INCHES DISTRIBUTED IN THE KLONDIKE AND INDIAN RIVER WATER SHEDS IN THE SAME RATIO AS THE PLANT ABOVE.

Estimated cost..	\$4,898,900
Annual cost..	\$460,223.00
Cost of water per day..	3,835.00
Daily cost per miner's inch..	·3835
Daily cost per cubic yard..	·064

Water sold at 35c. and 15c. per miner's inch,
as in the first estimate.

Annual revenue..	490,000
Annual cost..	460,000
Profit and loss..	30,000

Would pay for itself in 17 to 18 years.

Estimated cost of the first plant, but without the Indian watershed distribution, and that amount of water being added to the Klondike water shed:—

Estimated cost..	\$5,632,701
Annual cost..	\$518,087.00
Cost of water per day..	4,318.00
Cost of water per miner's inch..	·288
Cost of water per cubic yard...	·048

Water sold at 35c. and 15c. per miner's inch,
as in the first estimate.

Annual revenue...	738,000
Annual expenses..	518,087
Profit and loss..	219,915

This plant would pay for itself in about 11 years.

Estimated cost of a plant of 10,000 miner's inches.

KLONDIKE WATERSHED DISTRIBUTION.

Estimated cost...	\$4,437,000
Annual cost..	\$450,000.00
Cost of water per working day..	3,750.00
Cost of water per miner's inch..	·37½
Cost of water per cubic yard...	·06¼

Water sold at 35c. and 15c. per miner's inch,
as in the first estimate.

Annual revenue..	490,000
Annual cost..	450,000
Profit and loss..	40,000

This plant would pay for itself in 16 to 17 years.

SESSIONAL PAPER No. 25b

ESTIMATED COST OF PROPOSED WATER SYSTEM FOR THE KLONDIKE MINING DISTRICT.

(Capacity, 15,000 miner's inches.)

MAIN CONDUIT.

On the outer bank of canals the inside and outside slope to be $1\frac{1}{2}$ feet horizontal to 1 foot vertical, upper bank slope $\frac{1}{2}$ foot horizontal to 1 foot vertical. Top of embankment 3 feet wide.

Section 1—

Tunnel No. 1.—From head of Leotta creek and Six Pup, 8,710 feet, 6,600 feet long, at \$35 per foot..	\$ 231,000 00
Canal.—From head of Leotta to head of Simplon creek: 34.26 miles long. Width: top, $31\frac{1}{2}$ feet; bottom, 18 feet; depth, 7 feet; depth of water, 5 feet. Capacity 11,374 miner's inches; length, 34.26 miles. Average, 16,632 cubic yards of earth excavation at 50c. per cubic yard, 1,663 cubic yards excavation of solid rock, frozen ground or loose rock, &c., at \$1.25 per cubic yard, \$10,385 per mile..	355,790 10
Twelve waste weir and waste gates, at \$400..	4,800 00

Double syphon No. 1—

2,950 feet long; 4 feet diameter; capacity, 10,960 miner's inches; weight, 538,079 lbs. at $8\frac{1}{2}$ c..	45,736 71
One pressure box at \$1,000..	1,000 00

Section No. 2—

Tunnel No. 2.—From head of Simplon and Janson creek: 8 feet x 10 feet, 8,340 feet long, at \$35 per foot....	291,900 00
Canal.—From head of Simplon creek to intake main Klondike river: 51.26 miles long. Width: top, $34\frac{1}{2}$ feet; bottom, $20\frac{1}{2}$ feet; depth, $7\frac{1}{2}$ feet; depth of water, $5\frac{1}{2}$ feet. Capacity, 15,444 miner's inches. Average, 22,500 cubic yards of earth excavation at 50c. per cubic yard, and 2,250 cubic yards of excavation of solid rock, frozen ground, &c., at \$1.25 per cubic yard, \$14,062 per mile..	\$720,818 00
Forty waste weir and waste water gates at \$600 each..	24,000 00
Four pressure boxes at \$1,400 each..	5,600 00
	<hr/>
	750,418 00

Double syphon No. 2—

13,200 feet long, 5 feet diameter. Capacity, 15,000 miner's inches. Weight, 5,263,342 lbs., at $8\frac{1}{2}$ c..	447,384 07
---------------------------------------------------------------------------------------------------------------------------	------------

Double syphon No. 3—

43,830 feet long, 6 feet diameter. Capacity, 16,240 miner's inches. Weight, 21,509,556 lbs., at $8\frac{1}{2}$ c..	1,828,312 26
----------------------------------------------------------------------------------------------------------------------------	--------------

Double syphon No. 4—

8,006 feet long, 5 feet diameter. Capacity, 15,322 miner's inches. Weight, 5,587,652 lbs., at $8\frac{1}{2}$ c..	474,950 42
--------------------------------------------------------------------------------------------------------------------------	------------

Double syphon No. 5—

6,600 feet long, $5\frac{1}{2}$ feet diameter. Capacity, 17,384 miner's inches. Weight, 2,338,676 lbs., at $8\frac{1}{2}$ c..	198,787 46
---------------------------------------------------------------------------------------------------------------------------------------	------------

Wagon road—

110 miles of wagon road, at \$1,500..	165,000 00
-----------------------------------------------	------------

Bridges—

One bridge on Klondike river, one 100-foot span and two 30-foot spans	20,000 00
One bridge on Flat creek, one 50-foot span.. .. .	3,000 00
One bridge on Hamilton creek, one 50-foot span.. .. .	3,000 00

Telephone line—

110 miles of telephone line, at \$250 per mile.. .. .	27,500 00
-------------------------------------------------------	-----------

Section houses—

Twelve section houses, one at the head of each tunnel and at the head of each pressure box, one at the intake and four along the canal line, at \$1,500 each.. .. .	18,000 00
---------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------

Dam—

A dam, 8 feet high and 300 feet long to be constructed of timber in crib form, filled with rock and earth, at a cost of.. .. .	10,000 00
--------------------------------------------------------------------------------------------------------------------------------	-----------

IV.

ESTIMATED COST OF PROPOSED DISTRIBUTION KLONDIKE RIVER WATERSHED.

(Capacity, 10,000 miner's inches.)

On the outer bank of canals the inside and outside slope to be 1½ horizontal to 1 vertical, upper bank slope to be ½ horizontal to 1 vertical ; top of embankment 3 feet wide.

Canal—

From head of Six Pup to Last Chance creek, 16 miles long; width, top, 29 feet; bottom, 18 feet; depth, 6 feet; depth of water, 4¼ feet :	
Capacity, 10,000 miner's inches. Average, 13,831 cubic yards of earth, excavation at 50c., and 1,426 cubic yards of excavation of rock in place, frozen ground, loose rock, &c., at \$1.25 per cubic yard at \$8,697 per mile.....	\$ 139,152 00
Sixteen waste weirs and waste gates at \$550	8,800 00

Syphon No. 1.—Hunker—

2,112 feet long, 5½ feet diameter, capacity 10,680 miner's inches ; weight, 526,984 lbs. at 7¾ c.	40,834 28
One pressure box at \$1,275.. .. .	1,275 00

Syphon No. 2.—Gold Bottom—

2,900 feet long, 5¼ diameter ; capacity, 9,200 miner's inches; weight, 653,569 lbs. at 7½c. per lb.....	49,017 67
One pressure box at \$1,150....	1,150 00

Syphon No. 3.—Last Chance creek—

1,584 feet long, 4¾ feet diameter ; capacity, 7,200 miner's inches ; weight, 207,226 lbs. at 7½c per lb.....	15,541 75
One pressure box at \$890.. .. .	890 00

SESSIONAL PAPER No. 25b

Canal—

From Last Chance creek to Bear creek, 7 miles long; width, top 22 feet; bottom, 16 feet; depth, 5 feet; depth of water $3\frac{1}{2}$ feet; capacity, 75,000 miner's inches. Average, 10,692 cubic yards of earth excavation at 50 cents per cubic yard and 1,188 cubic yards excavation of rock in place, frozen ground, loose rock, &c., at \$1.25 per cubic yard, \$6,831 per mile....	48,817 00
Seven waste weirs and waste gates at \$425....	2,975 00

Syphon No. 4.—Bear creek—

1,848 feet long, $4\frac{1}{4}$ diameter; capacity, 5,280 miner's inches; weight, 141,255 lbs. at $7\frac{1}{4}$ c. per lb....	10,594 00
One pressure box at \$635....	635 00

Canal—

From Bear creek to Quigley gulch, 2 miles long; width, top 21 feet; bottom, 16; depth $5\frac{1}{2}$ feet; depth of water, 3 feet; capacity, 5,500 miners inches; 9,623 cubic yards of earth excavation at 50c. per cubic yard and 1,068 cubic yards excavation of rock in place, frozen ground, loose rock, &c., \$1.25 per cubic yard, \$6,139 per mile....	12,218 00
Two waste weirs and waste gates at \$310..	620 00
From Quigley creek to Pure Gold gulch, 2 miles long width, top 17 feet; bottom, 12 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 4,220 miner's inches. Average, 6,950 cubic yards earth excavation at 50c. per cubic yard, and 773 cubic yards excavation of rock in place, frozen ground, and loose rock, &c., at \$1.25 per cubic yard, \$4,441 per mile....	8,882 00
Two waste weirs and waste gates at \$250 each....	500 00
From Gold gulch to Grand Forks, 12.50 miles long; width, top 12 feet; bottom, 3 feet; depth of water, 3 feet; capacity, 2,180 miner's inches. Average, 4,050 cubic yards of earth excavation at 50c. per yard and 450 cubic yards excavation of rock in place, frozen ground and loose rock at \$1.25 per cubic yard, \$2,587 per mile....	32,337 00
Twelve waste weirs and waste gates at \$125....	1,500 00

Canal—Hunker creek—

From the mouth of Trilby gulch to opposite Henry gulch, Hunker creek, to pick up water already used and to sell it over again: 8 miles long. Capacity, 2,500 miner's inches at \$4,000 per mile.	32,000 00
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------

Canal—Bonanza creek—

From mouth of Boulder creek to mouth of Bonanza creek to pick up water already used and to sell it again: 8 miles long. Capacity, 2,000 miner's inches at \$3,696 per mile....	29,388 00
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------

V.

ESTIMATED COST OF PROPOSED DISTRIBUTION, INDIAN RIVER
WATERSHED.

(Capacity, 4,000 miner's inches.)

On the outer side bank of canal, the inside and outside slope to be 1½ horizontal to 1 vertical; upper bank slope to be ½ horizontal to 1 vertical; top of embankment, 3 feet wide.

Canal—

From the head of Janson creek to Dominion creek, 3.75 miles long; width, top 23 feet; bottom, 14 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 4,500 miner's inches, 6,985 cubic yards of earth excavation at 50 c. per cubic yard and 765 cubic yards of excavation of rock in place, frozen ground, loose rock, &c., at \$1.25 per cubic yard, \$4,450.....	16,687 50
Two waste weirs and waste gates at \$240.....	480 00

Syphon No. 2—

1,584 feet long; 4 feet diameter. Capacity, 4,472 miner's inches; weight, 136,496 lbs. at 8 c. per lb.....	10,919 68
One pressure box at \$570.....	570 00

Canal—

From Dominion Syphon, Gold Run creek, 8.05 miles long; width, top 17 feet; bottom, 12 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 4,000 miner's inches. Average, 7,722 cubic yards earth excavation at 50c. per cubic yard and 858 cubic yards excavation of rock in place, frozen ground, loose rock, &c., at \$1.25 per cubic yard, \$4,437 per mile.....	35,707 85
Eight waste weirs and waste gates at \$220..	1,760 00

Syphon No. 2—

2,112 feet long; 3½ feet diameter. Capacity, 3,140 miner's inches; weight, 161,059 lbs. at 8c.....	12,884 72
One pressure box at \$380...	380 00

Canal—

From Gold Run syphon to Sulphur creek, 3.30 miles long; width, top 16 feet; bottom, 10 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 3,000 miner's inches. Average, 6,255 cubic yards of earth excavation at 50c. per cubic yard and 695 cubic yards excavation of rock in place, frozen ground, and loose rock at \$1.25 per cubic yard... ..	13,186 00
Three waste weirs and waste gates at \$160.....	480 00

Syphon No. 3—

4,224 feet long; 3 feet diameter. Capacity, 2,268 miner's inches; weight, 259,572 lbs. at 8c.....	20,605 76
One pressure box at \$260...	260 00

SESSIONAL PAPER No. 25b

Canal—

From Sulphur creek to New Zealand creek, 26.50 miles long; width, top 14 feet; bottom, 8 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 2,000 miner's inches. Average, 5,625 cubic yards of earth excavation at 50c per cubic yard and 625 cubic yards excavation of rock in place, frozen ground and loose rock, &c., at \$1.25—\$3,693.75 per mile....	95,234 37
Twenty-six waste weirs and waste gates at \$110,....	2,860 00

Syphon No. 4—

1,584 feet long; 2½ feet diameter. Capacity, 1,538 miner's inches; weight, 55,036 at 8¼c.....	4,540 46
One pressure box at \$200....	200 00

Canal—

From New Zealand creek to Quartz creek, 9.05 miles long; width, top 9½ feet; bottom, 4 feet; depth, 5 feet; depth of water, 3 feet. Capacity, 1,500 miner's inches. Average, 5,040 cubic yards of earth excavation at 50c. per cubic yard and 540 cubic yards excavation of rock in place, frozen ground and loose rock at \$1.25 per cubic yard, \$3,175 per mile....	28,733 75
Nine waste weirs and waste gates at \$220....	1,980 00

Syphon No. 5—Quartz creek—

3,960 feet long; 2½ feet diameter. Capacity, 1,237 miner's inches; weight, 263,662 lbs. at 7½c.....	19,774 56
One pressure box at \$505....	505 00

Canal—

From Syphon No. 1 to about creek claim No. 7 below Discovery Dominion—	
Nine miles long. Capacity, 1,200 miner's inches at \$3,550 per mile..	31,950 00
Nine waste weirs and waste gates at \$60....	540 00

Canal—

From Syphon No. 2 to about creek claim No. 70, Gold Run creek, 4 miles long. Capacity, 1,200 miner's inches at \$3,550 per mile..	14,200 00
Four waste weirs and waste gates at \$60....	240 00

Canal—

From Syphon No. 3, to about creek claim No. 7, below Discovery Sulphur creek: 11 miles long. Capacity, 1,200 miner's inches at \$3,550 per mile....	39,050 00
Ten waste weirs and waste gates at \$60.....	600 00

Canal—

From mouth of Gold Run and Sulphur creek to opposite mouth of Australia, to pick up water already used and to sell it over again, 7 miles long. Capacity, 2,000 miner's inches at \$3,696 per mile..	22,176 00
Six waste weirs and waste gates at \$120....	720 00

VI.

COST OF MAINTENANCE OF WATER CONDUITS—BY BOWIE.

in the mining districts of California, ditches are constructed badly, with steep grades and on irregular lines with numerous sharp curves. The cross section, originally uniform, becomes more or less varied. They are built through steep slopes, in regions exposed to snow slides and wash-outs. The average cost of maintenance is about \$500 per mile.

WATER CONDUITS IN ALASKA AND THE NORTH.

Locality.	Length of earth work.	Length of rock work.	Grade per mile.	Width.		Depth.	Miners' inches.	Greatest head.	Cost of construction per M.	Annual cost of maintenance per M.
				Top	Bottom					
Sunrise District.										
Miller Creek.....	2 miles.....		18'				1,500	100	\$	\$
Allan, B.C.										
Pine Creek.....	4½ "		8'	12	6	4	1,500	135	3,500	
".....	5½ "		8'	9	4	3	1,000	162	3,000	
".....	3 "		8'	7	4	3	700	350		
Spruce Creek.....	2,000'		5'	9	4	5	900	200		
".....	1½ miles.....			7	4	2½	1,200	200	5,200	
Dawson District, Y.T.										
Miller Creek.....	9½ "		8'	8½	3½	3½	1,200			
".....	8,6 "		8'	5½	2½	1½	600			
Bonanza Creek.....	9,400'		13.7'	5	3	1½	100			350
".....	2 miles.....		7'	5	2	3	150	150		
".....	8 "		8'	6	3	2			1,500	
Eldorado Creek.....	6 "		10'	8	4	3	120	120	3,000	
Hunker Creek.....	4 "			3	2	2	150	20	2,500	150
".....	5½ "			3	2	1½	100	40	2,000	
Forty-mile District.										
Wade Creek.....	1 "		8" to 9"				120			
".....			2" to 13"				200			
Birch Creek District.										
Deadwood Creek.....	750'		6" to 8"				120			
".....	3,000'						120	65	500	

SESSIONAL PAPER No. 25b

Fairbanks District.									
Fairbanks Creek.	900'	.....	4" to 5"	2	2	1	100	5,800	.....
Cleary Creek.	3,000'	.....	3'	5	4	1½	150	6,000	500
"	500'	.....	3'	3	2	1½	75	2,500	.....
"	1½ miles.	.....	3'	3	2	1½	50	3,200	.....
"	1	.....	3'	3	2	1½	50	2,000	.....
Nome District.									
Nome River.	17	"	3.37'	11	8	3	1,000	2,000	300
"	26	"	4.5'	14	10	3	2,000	3,000	300
"	5	"	6.5'	11	8	3	2,000	2,300	.....
Basin Creek.	2½	"	10.0'	7½	4	2	250	1,500	.....
Glacier Creek.	5	"	5.0'	4	3	1	115	.....	.....
Dexter Creek.	.....	.....	.....	5	3	1	120	.....	.....
Cripple River.	4	miles.	45.0'	8	6	1	775	2,500	.....
Council District.									
Ophir Creek.	4	"	4.0'	9	6	2	1,000	4,000	.....
"	13	"	3.3'	16	10	3	3,300	6,000	300
"	6	"	3.3'	8	5	2	600	3,000	.....
"	1½	"	5.3'	9	6	2	150	5,330	.....
"	2½	"	3.3'	9	6	3	1,500	.....	.....

VII.

PRICE OF WATER PER MINER'S INCH.

Nome District—

'The Mioce Ditch Company' sells some of its water to the miners on Glacier, Anvil and Dexter creeks at the rates of \$1 per miner's inch, under pressure, and at 50c. for water that has been once used.

The miner's inch used is equal to 1.2 cubic feet per minute. The above price reduced to the Klondike miner's inch or 1.5 cubic feet per minute is \$1.25 and 62½c. per miner's inch.

California—

'The South Yuba Water Company' has a system of 500 miles of ditches.

The company, which has a strong competition from the Boy Power Company, charges 18c. per miner's inch per 24 hours.

It is considered by some of the officials of the Boy Power that any industry wishing to use water at that price for power purposes must obtain it under a 400-foot head to generate power as cheaply as the Boy Power Company can furnish electricity at one cent per K.W. per hour.—(A. J. Beaudette, mining engineer, Dawson.)

VIII.

DUTY OF A MINER'S INCH.

Is the quantity of material moved by 1 inch of water in 24 hours. It depends on quantity of water and pressure, character of material washed, height of bank, size and grade of sluice and kind of riffle.

In many mines the gravel may be easily broken down, but may be hard to carry down to and move through the sluice on account of too small amount of water from the pipe; of a light grade; disproportionate width of box or the use of obstructive riffles. In such a case if a bank head water is available, a larger amount of gravel will be carried to and through the sluices.

In California, according to 'Bowie' in the North Bloomfield mine, the duty varied from 3.86 to 4.8 cubic yards. At La Grange mines the duty was from 1.08 to 1.82 cubic yards, average 3.09 cubic yards per miner's inch. In both cases the riffle pavement was principally blocks.

The following is taken from 'Methods and costs of Gravel and Placer mining in Alaska' by Chester Wells Purington, says: Table 1. (Page 139) is instructive as showing the variation in duty of the miner's inch under the different governing conditions in the north. The duty of a miner's inch in the Klondike is large, estimated at 8 cubic yards in twenty-four hours in the operation described on page 137 with water under 130 foot head and grade of 12-inches to 12 feet in the sluice boxes, a variable amount of bank head water from 25 to 100 miner's inches being used. The high duty is accounted for by the fact that the material washed is well rounded, by the absence of large stones, heavy grade of sluices and the fact that block riffles are generally employed. It is stated by the Klondike operators that were the whole channel gravels unfrozen the duty of the inch would be twice as large. This is not impossible as the bench gravel presents most favourable characteristics for easy handling. In the following table the duty has been given in terms of the total amount of water used including bank monitor and elevator water. The low duties in Nome are accounted for principally by the fact that one-half to two-thirds of the water is generally diverted for use in the hydraulic tailings left and partly by the fact that the gravel is flat and rough.

SESSIONAL PAPER No. 25b

TO HYDRAULIC CREEK CLAIMS.

Will it pay to hydraulic creek claims? Many miners after reading 'Methods and costs of gravel and placer mining in Alaska,' by Mr. Purington, came to the conclusion that it would not pay to work creek claims by the hydraulic method and hydraulic lifts.

Mr. Purington takes a typical Alaska case, as follows:—

Assume a body of material which handled at the rate of 750 cubic yards per day can be worked out in six seasons, that the section consists of two yards of muck and of $1\frac{1}{2}$ yards of gravel, which has a tenor of \$3 per cubic yard. This material can be all handled by the hydraulic method at an expense of 50c. per cubic yard.

Actual working costs including superintending.

In order to make this hydraulic method available, a ditch carrying 1,000 miner's inches of water at lowest stage must be built at a cost of \$100,000. Let this cost include the hydraulic equipment. Simple interest charged on the investment and maintenance of ditch and plant will amount to \$90,000 additional.

Allowing nothing for purchase of property the five annual payments to amortize of plant fund will amount each to \$38,000.

Allow 100 days each season actual working time, then the amount per cubic yard which must be added to cover payment to the sinking fund will be \$0.542 per cubic yard, or a total of \$1,042.

In the Klondike as in the Alaskan case, let us assume the material can be handled by the hydraulic method at an expense of 50c per cubic yard actual working cost, including superintendence. With the proposed water system, the miner to make this hydraulic method available has to put an hydraulic equipment on his claim at a cost of \$4,000 to \$8,000.

Assuming the duty of a miner's inch to be only $\frac{1}{2}$ to a $\frac{1}{3}$, with the hydraulic elevator, the miner will have to pay for water, at the rate of 15c per cubic yard. The five annual payments to amortization of plant fund will amount each to from \$950 to \$1,900, say \$1,900. Allow 100 days each season actual working time. Then the amount per cubic yard which must be added to cover payment of sinking fund will be .02 $\frac{1}{2}$ c. or a total of 67 $\frac{1}{2}$ c. per cubic yard, a difference in favour of the Klondike water system of 36 $\frac{1}{2}$ c. per cubic yard and on the cost of the plant \$92,000.

A cheaper equipment to work creek claims would be to operate a scraper plant by means of a small Pelton water wheel. The sluice boxes or washing plant built to a height of 25 feet or 30 feet above the ground with the water wheel set on it, the ground from the sluices to be approached by a broad inclined platform.

With 100 miner's inches and 250 feet pressure the water motor will generate 60 horse-power and will handle a scraper plant of a capacity of 750 cubic yards per 24 hours.

The water from the water wheel to be used for sluicing.

The cost of water and power for such a plant would be \$35 per 24 hours, or \$0.0466c. per cubic yard besides the service of six men on a shift. This would be the cheapest and most economical plant to work individual creek mining claims. The total running expense of the plant including depreciation and interest on the plant, should not exceed \$0.30c. per cubic yard.

Along Indian river from Sulphur creek to Quartz creek by the proposed water system, there is an available head of about 400 feet, and with 1,000 miner's inches would generate over 1,100 horse-power, sufficient to run five or six dredges. The cost of water per day, would be \$350. This is the right kind of power for Indian and Klondike river valleys. As will be seen by the profile from Bear creek to the mouth of Bonanza creek there will be an available head of about 800 feet and cost of water with that head will be the same price paid by the Orila people for dredging, &c. From the South Yuba Water Company and from the Boy Water Company, that is to say, water at 35c. per miner's inch along those points could be furnished for electricity at 1c. per K.W. hours.

With the proposed water system the question of fuel would be settled.

X

MAIN CONDUIT.

DOUBLE SYPHON No. 1.—2,950 feet long, 4 feet diameter. Capacity, 1,096 miner's inches. Greatest depression, 377 feet. Total weight, 538,079 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal foot.	Total Weight.
				Lbs.	Lbs.
1,390	100	.088	0.93 $-\frac{3}{32}$	54.56	75,838
160	125	.100	0.109 $-\frac{1}{8}$	60.87	9,739
140	150	.120	0.125 $-\frac{1}{8}$	69.81	9,773
160	175	.144	0.148 $-\frac{9}{16}$	82.81	13,249
140	200	.174	0.18 $-\frac{7}{16}$	100.44	14,061
60	225	.196	0.203 $-\frac{6}{16}$	113.28	6,796
140	250	.218	0.2187 $-\frac{7}{32}$	122.13	17,098
100	275	.240	0.25 $\frac{1}{4}$	139.54	13,554
130	300	.272	0.281 $-\frac{9}{32}$	157.08	20,420
80	325	.294	0.3 $-\frac{1}{16}$	167.58	13,406
150	350	.316	0.34 $-\frac{0}{16}$	169.82	28,473
300	375	.338	0.34 $-\frac{0}{16}$	189.82	56,946
					538,079

DOUBLE SYPHON No. 2.—13,200 feet long, 5 feet diameter. Greatest depression, 585 feet. Capacity, 15,600 miner's inches. Total weight, 5,263,342.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal foot.	Total Weight.
				Lbs.	Lbs.
600	100	.11	.12 $-\frac{11}{16}$	79.34	47,604
700	125	.1374	.134 $-\frac{10}{16}$	93.53	65,338
800	150	.1648	.165 $-\frac{8}{16}$	115.15	92,130
800	175	.1922	.203 $-\frac{6}{16}$	141.74	113,390
500	200	.22	.22 $-\frac{5}{16}$	153.52	76,760
450	225	.2474	.259 $-\frac{3}{16}$	185.47	83,461
750	250	.2748	.284 $\frac{2}{16}$	198.25	148,687
1,800	275	.3022	.31 $-\frac{5}{16}$	218.11	392,598
450	300	.3300	.34 $-\frac{0}{16}$	237.28	106,776
650	325	.3574	.375 $-\frac{3}{8}$	261.81	170,176
400	350	.3848	.406 $-\frac{13}{32}$	283.49	113,556
600	375	.4112	.425 $-\frac{000}{16}$	296.14	177,684
200	400	.44	.454 $-\frac{0000}{16}$	316.89	63,378
100	425	.4674	.4687 $-\frac{15}{32}$	327.26	32,726
100	450	.4948	.50 $-\frac{1}{16}$	349.01	34,901
100	475	.5222	.56 $-\frac{3}{8}$	392.70	39,270
150	500	.55	.56 $-\frac{9}{16}$	392.70	58,905
180	525	.5774	.62 $-\frac{5}{8}$	436.23	157,041
180	550	.6048	.625 $-\frac{5}{8}$	436.23	
240	575	.6322	.685 $-\frac{11}{16}$	475.53	470,774
750	600	.66	.685 $-\frac{11}{16}$	475.53	
					5,263,342

SESSIONAL PAPER No. 25b

DOUBLE SYPHON No. 3.—43,830 feet long, 6 feet in diameter. Greatest depression, 472 feet. Capacity, 16,240 miner's inches. Total weight, 21,509,556 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
2,323.....	75	.099	.109-12	100.35	233,113
845.....	100	.132	.134-10	124.93	104,974
3,168.....	125	.164	.165-8	138.79	439,685
3,855.....	150	.198	.203-6	170.02	650,427
15,153.....	175	.232	.238-4	219.40	3,324,568
1,056.....	200	.2636	.284-2	238.02	251,349
1,056.....	225	.2960	.3-1	251.51	265,594
3,168.....	250	.3296	.34-0	284.88	901,075
7,233.....	275	.3626	.375- $\frac{3}{8}$	314.33	2,273,548
2,535.....	300	.3954	.4062- $\frac{1}{2}$	340.46	863,066
1,214.....	325	.4284	.437- $\frac{7}{16}$	366.37	444,773
739.....	350	.4614	.468- $\frac{1}{2}$	392.92	290,367
528.....	375	.4944	.50- $\frac{1}{2}$	419.05	221,258
580.....	400	.5272	.56- $\frac{9}{16}$	471.30	273,344
110.....	425	.5692	.56- $\frac{9}{16}$	471.30	51,843
307.....	450	.5932	.62- $\frac{1}{8}$	523.76	160,794
					21,509,556

DOUBLE SYPHON No. 4.—8,006 feet long, 5 feet diameter. Greatest depression 430 feet. Capacity, 15,322 miner's inches. Total weight, 5,587,652 lbs.

Length.	Head.	Computed thickness.	Nearest No. to B. G.	Weight per lineal ft.	Total Weight.
		Ins.			Lbs.
406.....	100	.11	.12-11	79.34	32,195
400.....	200	.22	.22-5	153.52	61,408
320.....	300	.33	.34-0	237.28	75,929
380.....	400	.44	.454-0000	316.89	120,418
900.....	450	.49	.50- $\frac{1}{2}$	349.01	314,109
740.....	475	.5222	.56- $\frac{13}{16}$	392.70	290,498
4,860.....	500	.55	.56- $\frac{1}{16}$	392.70	1,907,822
					5,604,758

DOUBLE SYPHON No. 5.—6,600 feet long, 5½ feet diameter. Greatest depression 202 feet. Capacity, 17,384 miner's inches. Total weight, 2,338,676 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
170.....	100	.121	.134-10	102.96	16,720
110.....	125	.151	.165-8	126.70	13,937
720.....	150	.181	.203-6	155.49	111,952
1,150.....	175	.211	.22-5	168.58	193,821
4,250.....	200	.242	.25- $\frac{1}{4}$	191.86	815,405
6,600					2,338,676

PROPOSED DISTRIBUTION.

(On the Indian River Watershed.)

SYPHON No. 1.—DOMINION CREEK.—1,584 feet long, 4 feet diameter. Greatest depression, 227 feet. Capacity, 4,472 miner's inches. Total weight, 136,496 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
464.....	100	.087	.095-13	53.05	24,615
110.....	125	.109	.109-12	60.79	6,686
130.....	150	.131	.134-10	74.74	9,716
100.....	175	.153	.165-8	92.15	9,215
160.....	200	.176	.18-7	100.16	16,025
620.....	225	.198	.203-6	113.29	70,239
					136,496

SYPHON No. 2.—GOLD RUN.—2,112 feet long, 3½ feet diameter. Greatest depression, 260. Capacity, 3,140 miner's inches. Total weight, 161,059 lbs.

Length.	Head.	Computed thickness.	Nearest No B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
612.....	125	.0806	.083-14	40.59	24,840
100.....	150	.1081	.109-12	53.30	5,330
140.....	175	.1256	.134-10	65.53	9,164
80.....	200	.1533	.165-8	80.65	6,452
100.....	221	.17	.18-7	88.00	8,800
330.....	250	.19	.203-6	99.28	33,762
750.....	275	.21	.22-5	107.59	80,692
					169,050

SYPHON No. 3 (Sulphur).—4,224 feet long, 3 feet diameter. Greatest depression, 285. Capacity, 2,268 miner's inches. Total weight, 259,572 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
824.....	125	.082	.083-14	36.64	30,191
180.....	150	.099	.109-12	45.50	8,140
140.....	175	.115	.12-11	50.20	7,028
180.....	200	.132	.134-10	56.00	10,080
150.....	225	.148	.148-9	61.83	9,274
150.....	250	.165	.165-8	70.05	10,507
700.....	275	.181	.203-6	84.78	59,346
1,900.....	300	.198	.203-6	84.78	161,006
					295,572

SESSIONAL PAPER No. 25b

SYPHON No. 4 (New Zealand).—1,584 feet long, 2¾ feet diameter. Greatest depression, 161 feet. Total weight, 55,036 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs. 3
1,064.....	125	.0756	.03-14	34.00	36,176
520.....	150	.0907	.095-13	36.32	18,860
					55,036

SYPHON No. 5 (Quartz Creek).—3,960 feet long, 2½ feet diameter. Greatest depression, 430. Capacity, 1,237 miner's inches. Total weight, 263,662 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
660.....	150	.079	.083-14	29.92	19,747
100.....	175	.092	.095-13	33.15	3,315
150.....	200	.110	.12-11	41.88	6,287
100.....	225	.122	.134-10	46.73	4,673
100.....	250	.134	.134-10	46.73	4,673
130.....	275	.147	.148-9	51.41	6,683
120.....	300	.165	.165-8	57.59	6,904
100.....	325	.177	.18-7	62.66	6,256
140.....	350	.190	.203-6	70.35	9,849
140.....	375	.203	.203-6	70.35	9,849
170.....	400	.220	.22-5	76.85	13,062
2,050.....	425	.232	.238-4	84.08	172,364
					263,66 2

XII.

PROPOSED DISTRIBUTION ON THE KLONDIKE RIVER WATERSHED.

SYPHON No. 1 (Hunker Creek).—2,112 feet long, 5½ feet diameter. Greatest depression, 390 feet. Capacity, 10,680. Total weight, 526,894 lbs.

Length.	Head.	Computed. thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
290.....	75	.09071	.095-13	72.94	21,138
120.....	100	.0121	.12-11	92.12	11,034
100.....	125	.01512	.165-8	126.70	12,670
130.....	150	.01815	.20-6	155.59	20,226
100.....	175	.021181	.22-5	168.87	16,887
70.....	200	.0242	.259-3	198.66	13,906
100.....	225	.02722	.284-2	218.20	21,820
100.....	250	.30255	.30-1	230.16	25,316
80.....	275	.33281	.34-0	261.00	20,880
100.....	300	.363	.38-00	291.78	29,187
110.....	325	.39327	.40-13	311.92	34,312
110.....	350	.42354	.425-000	326.37	35,900
80.....	375	.45381	.454-0000	348.59	27,887
620.....	400	.484	.50-½	383.92	238,030
					526,893

6-7 EDWARD VII.. A. 1907

SYPHON No. 2 (Gold Bottom Creek).—2,900 feet long, 5½ feet diameter. Greatest depression, 422 feet. Capacity, 9,200 miner's inches. Total weight, 653,569 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
400.....	75	.0864	.095-13	69.26	27,704
140.....	100	.1155	.12-11	87.49	12,248
150.....	125	.1443	.148-9	107.87	16,180
130.....	150	.1731	.18-7	130.79	17,003
130.....	175	.2019	.203-6	147.92	19,229
150.....	200	.2310	.238-4	173.55	26,032
120.....	225	.2598	.259-3	188.88	22,665
140.....	250	.2886	.30-1	218.82	30,634
140.....	275	.3174	.34-0	247.86	34,700
130.....	300	.5465	.38-00	277.10	36,021
190.....	325	.3753	.38.00	277.10	52,649
220.....	350	.4041	.425-000	309.92	68,182
160.....	375	.4329	.437- ⁷ / ₁₆	318.94	51,030
700.....	400	.462	.468- ¹⁵ / ₃₂	341.85	239,292
					653,569

SYPHON No. 3 (Last Chance).—1,584 feet, 4¾ feet diameter. Greatest depression, 262 feet. Capacity, 7,200 miner's inches. Total weight, 207,226 lbs.

Length.	Head.	Computed. thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
364.....	75	.078	.087-14	54.53	19,652
120.....	100	.104	.109-12	71.63	8,595
100.....	125	.130	.134-10	88.23	8,823
100.....	150	.156	.156- ⁵ / ₃₂	102.71	10,271
100.....	175	.182	.187- ³ / ₁₆	123.24	12,324
100.....	200	.209	.218- ³ / ₁₆	143.91	14,391
90.....	225	.235	.238-4	156.61	14,095
110.....	250	.261	.281- ³ / ₃₂	185.09	20,360
500.....	275	.287	.300-1	197.47	98,735
					207,226

SYPHON No. 4 (Bear Creek).—1,848 feet long, 4½ feet diameter. Greatest depression, 192 feet. Capacity, 5,280 miner's inches. Total weight, 141,255.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
998.....	100	.0935	.095-13	57.75	56,594
130.....	125	.1168	.12-11	70.42	9,154
120.....	150	.1401	.148-9	86.92	10,430
150.....	175	.1634	.165-8	96.84	14,526
450.....	200	.1870	.187- ³ / ₁₆	110.00	49,500
					140,204

SESSIONAL PAPER No. 25b

SYPHON No. 5 (Eldorado).—2,112 feet long, $2\frac{1}{2}$ feet diameter. Greatest depression, 260 feet. Capacity, 1,237 miner's inches. Total weight, 59,591 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
912.	150	.0822	.083-14	28.92	4,627
150.	175	.0959	.109-13	32.81	4,921
150.	200	.11	.12-11	41.87	6,280
150.	125	.1237	.134-10	46.71	7,006
210.	150	.1375	.148-9	51.63	10,842
450.	175	.1512	.165-8	57.59	25,915
					59,591

SYPHON No. 6 (French Gulch).—1,056 feet long, $2\frac{1}{4}$ feet diameter. Greatest depression, 126 feet. Capacity, 900 miner's inches. Total weight, 21,299 lbs.

Length.	Head.	Computed thickness.	Nearest No. B. G.	Weight per lineal ft.	Total Weight.
Ft.		Ins.			Lbs.
1,056.		.0605	.0605-16	.....	21,299

COMPARATIVE TABLE of Hydraulic Operations in the Yukon Territory and in Alaska.

	Hydraulic, no pumping of water.	Hydraulic with use of hydraulic elevator.	Open cut; shovelling into sluice boxes, including stripping top dirt, no pumping.	Open cut, horse scraping.	Open cut, shovelling into cars wheeling to bucket, cable tram to sluice.	Open cut; shovelling into cars, track and incline to sluice.	Open cut, shovelling into buckets or skips skidding or tramping and derricking to sluice.	Open cut, shovelling into sluice, tailings by hydraulic lift.	Open cut, steam shovel excavating; track and incline to sluice.	Open cut; steam scraping, generally on strip-ping work or tailings.	Dredging.	Drifting, partly frozen or thawed ground, requiring timbering.	Drifting and thawing solidly frozen ground little or no timbering.	Winter drifting and spring sluicing of dumps.	Mining or stripping over-burden by ground sluicing.	Hydraulic by means of pumped water.	Booming with self-dumping water gate.
<i>South Coast Province.</i>																	
Number of operations considered.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Capacity cubic yards in 24 hours.....	833	350	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Thickness of deposit, feet.....	30.3	25	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Thickness of gravel worked, feet.....	30.3	25	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Cost, b.....	\$0.20	\$0.31	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01	\$2.01
<i>Interior Province.</i>																	
Number of operations considered.....	13	13	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Capacity cubic yards in 24 hours.....	1,049	1,049	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
Thickness of deposit, feet.....	37.4	37.4	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Thickness of gravel worked, feet.....	37.4	37.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Cost, b.....	\$0.238	\$0.238	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39
<i>Seward Peninsula Province.</i>																	
Number of operations considered.....	4	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Capacity cubic yards in 24 hours.....	658	658	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145
Thickness of deposit, feet.....	12	12	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Thickness of gravel worked, feet.....	12	12	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Cost, b.....	\$0.89	\$0.89	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87	\$1.87

A. Lost time, the price paid for mining property, and the cost of equipment other than that relating to actual mining (e.g.) railways, wagon roads, etc., are not taken into account and any estimates based on these figures must have due allowance for these expenses, otherwise costs here given will be found too low.

d. Muck or fine silt and ice, from 50% to 75%.

c. Muck and top gravel.

SESSIONAL PAPER No. 25b

DAWSON, Y.T. January 31, 1906.

WILFRID THIBAudeau, Esq., M.E.,
Dawson, Y.T.

DEAR SIR,—As requested by you, I have prepared the following data as to mining conditions in the Klondike district, also a comparative statement showing the average cost of mining operations by the various methods in all parts of the placer fields.

Coarse gold was found first on the Fortymile river and its tributaries. A camp was established giving employment to about 200 men for the next ten years.

In 1896 George Cormac made a rich strike on Bonanza creek, a tributary of the Klondike river.

When the news of the find reached Fortymile, about 50 miles distant from Dawson, that camp was depopulated and every one stampeded to the new diggings.

Tales of the marvellous richness of the new strike soon reached the outside and in 1897, there was a rush of people from all parts of the world for the Klondike.

In the summer of 1898, the population of the Klondike was 35,000. Over 6,000 claims were staked and recorded on various tributaries of the Yukon, Klondike and Indian rivers within an area of 60 miles from Dawson.

Owing to the continuous frost in the ground, it had to be thawed by wood fires and prospecting work was necessarily slow.

The principal paying creeks in the vicinity of Dawson are : Bonanza, Eldorado, Hunker, Bear, Last Chance, Gold Bottom, All Gold, Dominion, Gold Run, Sulphur, and Quartz creeks; most of these creeks have been worked continuously since 1898.

Besides the creek valleys there are millions of cubic yards of gold-bearing gravels in the hillsides and bench claims that cannot be treated, until a large water system is installed.

Over 4,200 claims are held and represented by the owners this year; the representation work on each claim as imposed by the government costs \$200 per year.

About 900 of these claims are in the creek valleys, the others are gulch claims, hillside claims and bench claims.

The creek claims are 500 feet along the valley of the stream by 2,000 feet wide. Hillside claims are 500 x 1,000 feet, bench claims are 500 x 1,000 feet.

The bench and hillside claims are mostly from 150 to 300 feet above the creek valleys, on benches or ancient channels.

379 of the richest creek claims are worked out as far as the individual miner is concerned. They would all pay a profit to work over by more economical methods as they still contain millions of dollars in gold values not saved by the primitive method by which they are worked. The following estimate of the output of the camp to date was reached after consulting the principal shippers of gold dust, the banks and the government officials :—

	Output.
1896... ..	\$ 300,000
1897... ..	2,500,000
1898... ..	8,000,000
1899... ..	14,000,000
1900... ..	23,000,000
1901... ..	18,000,000
1902... ..	12,500,000
1903... ..	10,625,000
1904... ..	9,413,000
1905... ..	7,160,000
Total... ..	\$105,498,000

6-7 EDWARD VII., A. 1907

The above figures are computed at \$15 an ounce, the rate at which the government collects a royalty of two and a half per cent on the gross output.

1,915 assays from creeks, gulch, hillside space and bench claims in the district, gives \$16.53 per ounce (or 800 fine) as the average of the gold. At these figures the total output to date, namely, 7,033,200 ozs., or 241.13 tons would amount to \$116,258,896.

The following list gives locations of the various hills containing gold-bearing gravels at present being mined at a profit. The average depth to bed rock is also given for each hill :—

Creek.	Hill.	Depth.	Location.
		Feet.	
Eldorado.....	Ora Grande.....	30	Opposite No. 31 to 37 R. L.
	French Hill.....	50	" 13 to 17 L. L.
	Gold Hill.....	85	" 0 to 5 L. L.
Bonanza.....	Bunker.....	35	" 16 to 21 R. L., above discovery.
	Gold Hill.....	85	" 2a to 6 L. L.
	Skookum.....	40	" 1 to 2a L. L.
	Cheechake.....	90	" 1 above discovery to 6 below L. L.
	Adams.....	85	" 6 to 13 L. L.
	Magnet.....	90	" 13 to 17 L. L.
	American.....	100	" 17 to 19 L. L.
	Ora Fino.....	100	" 19 to 25 L. L.
	Monte Cristo....	100	" 25 to 28 L. L.
	King Solomon....	100	" 28 to 36 L. L.
	Boulder.....	60	" 36 to 43 L. L.
	49 Group.....	50	" 49 below L. L.
	Sour Dough.....	40	" 69 to 72 L. L.
	Concession Hill...	60	" 75 to 80 R. L.
	Trail Gulch Hill	125	" 80 to 84 R. L.
	Lovett Gulch.....	125	" 84 to 87 R. L.
Hunker.....	Burke's.....	20	" 3 to 6 below R. L.
	Whiskey.....	22	" 6 to 13 below R. L.
	Delhi.....	23	" 23 to 29 below L. L.
	Temperance.....	24	" 29 to 35 below L. L.
	Brener's.....	25	" 35 to 47 below R. L.
	Preachers Hill....	50	" 50 to 60 below L. L.
	McAllister's.....	30	" 38 to 40 below L. L.
	Paradise.....	60	" 60 to 80 below L. L.
	Prideaux.....	60	" 80 below to Last Chance L. L.
	Dago hill.....	80	" Last Chance to Henry Gulch. L. L.
	Chambers.....	120	" Hattie Gulch to mouth Hunker R. L.
	Envoldsen.....	80	" Henry Gulch to mouth Hunker L. L.
Last Chance Creek...	Treasure.....	30	" 10 to 15 above L. L.
	Holland's.....	25	" 6 to 10 above L. L.
	Sheriff.....	20	" Discovery to 5 above L. L.
	Australian..	40	" 8 above mouth to discovery, L. L.
	Dago.....	80	" 1 to 8 above mouth, L. L.
	Prideau.....	60	" 1 to 8 above mouth R. L.
All Gold..	McConaghy.....	50	" 50 above "
	Everett.....	50	" 80

The following estimate of cubic yards of gold-bearing gravels in the creek valleys and hills are compiled from a personal knowledge of the various localities and information received from mining operators. No survey of the quantities have been made. The average depth of gravel in the various creeks is 15 feet. The depth to bed rock as given below includes the over-burden of muck :—

SESSIONAL PAPER No. 25b

Creek.	Average depth to bedrock.	Estimated cubic yards.
	Feet.	
Eldorado.....	21	5,185,000
Bonanza.....	19	19,200,000
Hunker.....	24	15,645,000
Bear.....	28	733,000
Last Chance.....	18	1,352,000
Gold Bottom.....	17	3,125,000
Dominion.....	26	46,500,000
Gold Run.....	36	15,515,000
Sulphur.....	32	11,125,000
Quartz.....	24	4,400,000
All Gold.....	19	3,300,000
Total cubic yards in creek valleys (Klondike valley and Indian river valley not included).....		126,080,000

The following is an estimate of the total cubic yards contained in various hills :—

Creek.	Cubic yards.	Cubic yards.
Eldorado.....	7,790,000	
Bonanza.....	160,000,000	
Hunker.....	77,120,000	
Last Chance.....	11,000,000	
Bear.....	25,000,000	
All Gold.....	12,000,000	
Quartz.....	9,000,000	
		301,910,000
Total.....		427,990,000

(The hills along the Klondike river not included.)

I would estimate the value of gold-bearing gravels in the creek valleys at 50c. a cubic yard and the hills at 30c. a cubic yard. This would indicate the following gold values still remaining in the Klondike gravels :—

Creek valleys, 126,080,000 yards at 50 cents.....	\$ 63,040,000
Hills, 301,910,000 yards at 30 cents.....	90,574,000
Estimated total values.....	\$ 153,614,000

The values obtained from hydraulic work on the various hills on Bonanza creek last season average 55c. per cubic yard. On Hunker creek the average values obtained were 48c. per cubic yard.

Tailing deposits from old workings on all the creeks have in many cases been sluiced at a profit by hand-labour at a cost of \$1.80 per cubic yard. A great many so-called worked-out claims contain rich pockets in pillars of solid ground left by the old operators. The primitive methods of working ground in 1897 and 1898 by thawing by wood fires and hoisting by hand windlass gave way to the steam thawer and steam hoist with a contrivance attached to the cables by which the buckets are self-dumped.

There are also 16 steam shovels, 4 dredgers and about 26 hydraulic plants being operated in the district.

The methods of working creek claims are open cut and drifting. In open cutwork the ground is stripped from the surface to bed rock; the top stratum of muck is ground sluiced off with water; the top gravel is removed by steam scraper or horse scraper, leaving the pay-streak exposed; the pay-streak is from about two and a half feet above bed rock in the gravel to a depth of two or three feet in bed rock. The pay dirt is hoisted by steam hoist and carried by self-dumping buckets to the sluice

6-7 EDWARD VII., A. 1907

boxes. This method is used only from about June 1 to September 20, and, as a rule, is not an economical method if bed rock be at a greater depth than 14 feet.

The drifting method is used winter and summer; a steam plant is installed on the claim to be drifted, steam is carried in a pipe line to a three-quarter inch hydraulic pipe about 16 feet long which is called the steam point; it is driven in the ground where the shaft is to be sunk to bed rock—20 hours steaming with about 8 horse-power will thaw a circular shaft 5 x 18 feet; the dirt is left standing about 10 hours and then removed; process is repeated until bed rock is reached. Tunnels are now run from the shaft to determine the width of the pay-streak that can be profitably worked. The points are started in the face of the drift with hot water; the average length of a steam point for 25 horse-power plant is 7 feet. After the point is driven to its full length in the gravel steam is turned on; $1\frac{1}{2}$ horse-power is used for each point; 12 points are generally used with small plants. After steaming 10 hours the dirt is undisturbed for 24 hours. The hot dirt increasing the space thawed; each point will have an efficiency of 4 cubic yards of thawed dirt.

Another method of thawing is by using a pulsometer or force pump. This method is quite common on Quartz, Gold Run and Dominion creeks. A sump or well is dug in the bed rock or floor of the drift; by heating the water in this well and pumping through a hose and nozzle and hydraulicking the face of the frozen gravel the ground is readily thawed. A 30 horse-power plant will thaw a hundred and fifty yards in ten hours, by this method.

A pump can only be used where the bed rock is soft otherwise the gold would be carried in the crevices of bed rock by the water. The advantage of hot water system of thawing over the steam points is the fact that the face can be thawed to any depth required in using the steam pump; the escaping steam from the points very often thaws the waste gravel from the roof of the drift above the pay streak and as the dirt has to be handled when thawed it entails unnecessary expense. By using the pump for thawing the waste gravel is not so apt to thaw.

The total cost of machinery installed in the camp in the past eight years is approximately \$4,000,000. The fuel consumption to date is approximately \$5,500,000. The average cost of fuel in short cords is \$13 a cord.

A 50 horse-power plant, including hoist, carrier, cables, pumps and tools, costs about \$5,000 to install. The capacity of such a plant would be maximum 150 cubic yards per day. The average plant in use is 25 horse-power.

The following is a comparative statement of cost of operating in the district by the various methods in vogue.

When the ground can be drifted it is not considered advisable to open cut at a greater depth than 14 feet to bed rock. Ground is very seldom open cut at a greater depth than 20 feet and not even at that depth unless the ground is thawed; if the ground be thawed, drifting cannot be done unless the roof of the drift be heavily timbered; this makes drifting not only expensive, but dangerous and thus it is that even at a depth of 20 feet the open cut method may be more economical than the drifting process.

COST OF OPEN CUT METHOD.

Ground sluicing top muck or silt, as follows :—

	Cents.
Hunker creek, average per cubic yard.....	10
Bonanza creek, average per cubic yard.....	9
Dominion creek, average per cubic yard... ..	7 to 12

Scraping by steam or with horses—

	With steam.
Hunker, average per cubic yard, 45 with horse.. . . .	30
Bonanza, average per cubic yard, 55 with horse.. . . .	32
Eldorado, average per cubic yard.....	30
Dominion, average per cubic yard, 50 with horse.. . . .	28

SESSIONAL PAPER No. 25b

Pumping sluice head per 10 hours—

Hunker, 30 feet high, cost \$30; 16 feet, \$18.
 Bonanza, 22 feet high, cost \$28.
 Eldorado, 25 feet high, cost \$32.
 Dominion, 25 feet high, cost \$24.
 Dominion, with coal oil engine, 30 feet, cost \$15.

Steam thawing, using 12 feet points costs about 24c. per cubic yard. The efficiency of the steam point in open cut work is greater than drifting owing to the assistance of the heat of the sun.

Total cost of mining per square foot of bed rock, including pumping.

Hunker, average depth 18 feet, cost....	\$ 1 00
Bonanza, average depth, 18 feet, cost....	1 10
Eldorado, average depth 16 feet, cost....	0 95
Dominion, average depth 17 feet, cost....	0 90

The average size of the plant used in open cut work is 40 horse-power, the average capacity of such plant for 10 hours is 80 cubic yards. Open cut work is generally carried on with a night and day shift. The number of men employed on each shift being as follows :—

One foreman, 1 engineer, 1 fireman, 8 shovellers, 1 dump-box man. The average rate of wages is as follows:—Foreman, \$200 per month and board; engineer, \$180 per month and board; fireman, 50c. per hour and board; shovellers, 45c. per hour and board. The average cost of board per man to the operator is \$1.65 per day. Cooks per wages are \$100 per month and board. The foregoing prices of operating do not include any allowance for depreciation of plant.

DRIFTING METHOD.

The average cost of sinking a shaft 4 x 5 x 20 feet deep without timbers is \$2.50 per foot. When timbers are used the cost is increased by about \$3 a foot. The cost of drifting, thawing with steam and hoisting by hand, windlass 28 feet to bed rock, is \$2.15 per cubic yard, including the sluicing the pay dirt.

The average cost of drifting with the use of steam points and steam hoist, with self-dumping buckets and pumping, seepage water, is as follows :—

Hunker creek, cost per cubic yard....	\$ 1 35 to \$1 95
Bonanza creek, cost per cubic yard....	1 85
Eldorado, cost per cubic yard.....	1 90
Dominion, cost per cubic yard....	1 55 to 2 15
Sulphur.....	

Cost of mining per square foot of bed rock pumping ordinary seepage water, thawing with points or pumps, using steam hoist and self-dumper—

	Cents.
Hunker creek, average per square foot....	28 to 60
Bonanza creek, average per square foot....	55
Eldorado, average per square foot..	52
Dominion creek, average per square foot..	30 to 60
Sulphur, average per square foot...	36 to 50
Gold Run, average per square foot (thawing with pump)	50
Lower Dominion, average per square foot (thawing with pump).....	50
Quartz, average per square foot (thawing with pump)..	55

The above minimum cost of 28c. per square foot of bedrock on Hunker creek is obtained on 54 below discovery by using steam points 20 feet long. The dirt was al-

6-7 EDWARD VII., A. 1907

lowed to remain 72 hours undisturbed, the face of the drift being 350 feet; the plant used being 100 horse-power with a capacity of 150 yards in 10 hours, there being 12 shovellers in the drift.

Cost of drifting thawed ground on Lovett gulch hill including timbering tunnels or runways and working in chambers or sections, wheeling the dirt in cars on steel rails 800 feet to sluice and sluicing with gravity water, cost \$2.16 per cubic yard.

The tunnels are started from the rimrock of the hillside, the drifts are dry as seepage waters are easily drained through the tunnels without pumping, no steam is used at all.

The extra cost of sluicing the winter dump is about 30c. per cubic yard, the rate of wages in winter is about 25 per cent less than in summer. The foregoing rates for operating expenses do not include cost of tools, or depreciation in plant account.

DREDGING.

There are at present, 4 dredges and 6 shovels in the district. The Lewis River Dredging Company have for the past three years been operating a 3 feet Risdon dredge on Discovery group, Bonanza creek. This group of claims had been previously worked by the ordinary placer methods. The company are apparently satisfied with the results. The cost of the machine installed being about \$100,000.

The capacity is 500 cubic yards in 24 hours. The cost of working the ground is about 60c per cubic yard. The ground has to be thawed with steam. The Canadian Dredging Company are operating a 2½ foot Risdon dredge on 89 below Discovery, Bonanza creek. This dredge has a capacity of about 200 cubic yards per day, cost of installation was \$35,000. Cost of dredging this claim which is thawed being about 25c. per cubic yard. The Ogilvie dredge did not operate last season it is a prospecting dredge with a capacity of about 200 cubic yards a day. The Canadian Klondike Company have a 7-foot Marion dredge at the mouth of Bear creek, on the Klondike river, working the Boyle concession. The capacity of this machine is 2,000 cubic yards in 24 hours. The gravel is not frozen. The dredge is supplied with electric power from the company's steam-power station, the cost per cubic yard for operating being about 16c. The total cost of installation, the power station and dredge was about \$230,000. The power station has a capacity of 600 horse-power.

The Klondike Basin Gold Mining Company have just installed a 5-foot dredge, built by Allison and Chalmers Company, of Chicago. The dredge has a capacity of 2,500 cubic yards in 24 hours. Installation of this machine cost \$130,000. They will operate the group of claims near the mouth of the Klondike river next summer.

CHURN DRILLS.

There are several of these drills used for prospecting creek gravel in this district. A machine with a 6-inch core costs about \$3,700 in Dawson. The method of prospecting with the drill is found satisfactory and economical in testing ground for dredging. The cost of prospecting by this method is from \$1 to \$1.50 per foot at a depth of 25 feet; frozen ground costs about 25c. per foot extra. The results found by this method of prospecting are fairly accurate.

HYDRAULIC METHOD.

Very little hydraulic work was done in the camp previous to 1903. Prior to that year a few attempts were made to hydraulic by installing expensive pumping plants in the creek valleys to put water on the benches. This method was not successful although the possibilities of hydraulicking with a cheaper water supply were quite apparent. The prevailing impression that it would be impossible to hydraulic frozen gravels was proven erroneous. By exposing a face of several feet of gravel bank to the sun it will thaw readily; the giants are so arranged that the water can be turned on

SESSIONAL PAPER No. 25b

the gravel bank for a few hours then moved to another portion of the face leaving the frozen portion exposed to the sun.

There are 26 hydraulic plants in the district, two of them pumping water from the creeks, the others using gravity water with ditches from the gulches and creeks.

The local supply of water for hydraulic use is rather unsatisfactory, leaving the operator at the mercy of the weather. The average run last season on Eldorado and Bonanza creek was 50 days on Hunker creek about 52 days. Last season, however, was exceptionally dry.

THE AVERAGE COST OF HYDRAULICKING IS AS FOLLOWS :

Creek.	Miner's inches.	Head pressure.	Depth Gravel.	Duty per Miner's inch.	Cost per cubic Yard.
			Feet.	Yards.	Cents.
Eldorado.....	200	106	50	5	20
Bonanza.....	350	146	35	5½	21
Bonanza.....	200	160	20	6½	14
Bonanza.....	270	150	30	7	20
Hunker.....	100	50	20	6	14½
Hunker.....	100	59	22	6½	17
Hunker.....	150	70	24	6	18

MINER'S INCH.

A miner's inch of water is legally defined in the Yukon as half the quantity that will pass through an orifice 2 inches high by 1 inch wide with a constant head pressure of 7-inch pressure above the upper side of the orifice; it is equivalent to 15 cubic feet of water per minute or 9 gallons per minute.

A sluice head of water consists of 50 miner's inches.

130 miles of ditches have been constructed in the district to supply water to hydraulic plants at a total cost of over a quarter of a million dollars. The investment of so much capital for water that can only be used about 75 days in the season on the high hills proves conclusively that the bench gravels are extremely rich; with a permanent water supply from the Klondike river, the season of hydraulicking would be about 150 days.

DUTY OF A MINER'S INCH.

The average duty of a miner's inch would be greater with a permanent water supply than at present for the reason that the gravel banks would disintegrate more readily in July and August when the heat from the sun is stronger than in May, June and September the months when most of the hydraulic work with gravity water is done at present. This has been proven by the operations carried on by the two pumping plants working on Bonanza and Hunker creeks.

Little or no hydraulicking can now be done in July or August with gravity water; these are the dry months.

The Pacific Coast Mining Company have installed a \$120,000 pumping plant on Bonanza creek to work their group of claims on Cheehako hill. The cost of pumping water is given by the manager, as follows :—

Labour, one month, \$2,200 ; fuel, \$2,600 ; supplies, &c., \$600 ; figuring 25 running days per month, number of gallons pumped (3,000 or 270 miner's inches); cost per day for pumping, \$216; cost per day for hydraulic, &c., \$200; cost for handling one cubic yard, about 20c; cubic yards washed per day, 2,160. The efficiency of a miner's inch of water from the middle of June to the 1st of September being 8 cubic yards.

6-7 EDWARD VII., A. 1907

Alex. McDonald has installed a \$100,000 pumping plant on Hunker creek to work his properties on Dago hill. Pumping 130 miner's inches of water to an elevation of 360 feet using 160 horse-power boilers with fuel at \$12 per cord costs \$122 in 24 hours. Using three giants with a head pressure of 80 feet working against a bank 30 feet high it costs about 20c. per cubic yard to move the material. These figures do not include any allowance for depreciation of plant.

The Electric Light Company of Dawson are pumping water from Bonanza creek using electric power to an elevation of 350 feet and selling the same to the miners on Lovett hill at \$7.50 per hour for each sluice head.

The following operators are working with hydraulic plants in the Klondike district : Otto Brener & Co., French hill, Eldorado creek; White Channel Co., Gold hill, Bonanza creek. A. Fassbender, Skookum hill, Bonanza; Pacific Coast Mining Co., Cheechako hill, Bonanza; Bonanza Creek Mining Co., Adams hill, Bonanza; Anglo Klondike Mining Co., King Solomon hill Bonanza; Boulder Hill Group, Boulder hill, Bonanza; 49 Group, 4 (Hill, Bonanza); Bronson & Ray Concession Co., Sour Dough hill, Bonanza. J. B. Tyrrell, Sour Dough hill, Bonanza; Norwood-Fuller Co., American hill, Bonanza; Norwood-Fuller Co., Bunker hill, Bonanza; Burke Bros., Burke's hill, Hunker creek; Alaska Commercial Co., Whiskey hill, Hunker; Delhi, Rice & Peterson, Delhi hill, Hunker; Edwell, Roessel & Murray, Temperance hill, Hunker; August Larson, Temperance hill, Hunker; Godfred and Company, Temperance hill, Hunker creek; C. Curtis, Temperance hill, Hunker; McAllister & Co., Temperance hill, Hunker; Detroit Yukon Company, Brener's hill, Hunker; Elliot & Jensen, Paradise hill, Hunker; Redmond Bros., Paradise hill, Hunker; John S. Ray, Prideau hill. Last Chance; Charles Dolan, Treasure hill, Last Chance; Alex. McDonald, Dago hill, Hunker; Parks & Co., Concession hill, Klondike river; McConaghy & Co., McConaghy hill, All Gold.

SESSIONAL PAPER No. 25b

The following table will give the approximate cost of conduits constructed :—

Creek.	Length in Miles.	Top.	Bottom.	Depth.	Capacity Miners' Inches.	Cost per Mile to Construct.	Size of Flume.	Cost per Lineal foot, Complete.	Size of Syphon.	Cost per Lineal foot, Complete.	Earth and Slide Rock.
Eldorado.....	7½	7	3	3	1,000	\$ 2,500 00	48" x 24"	\$ 1 50	24" x 18"	\$ 4 50	
Bonanza.....	6	7	4	2	1,000	3,989 00	45" x 30"	1 30	26" x 24"		
Bonanza.....	7½	7	3	2	1,000	4,500 00	40" x 24"				
Hunker.....	6	5	2	.....	350	800 00					
Hunker.....	6	7	2½	3	500	1,600 00					
Gold Bottom.....	4	5	3	2	350	1,100 00					

6-7 EDWARD VII., A. 1907

The price per cubic yard of ditch construction varies under different conditions. The cost where earth was mixed with slide rock was 80c. per cubic yard. The least conditions being favourable was 14c. per cubic yard. The average cost being about 30c. per cubic yard.

Lumber costs \$40 per thousand in Dawson if bought in large quantities. Cost of working ground has been very much reduced in the Klondike district in the past five years. The following figures will show it is possible to work ground at a profit that would not pay to handle in 1901. A comparison of prices show a reduction, as follows: hardware and fittings, 43 per cent; groceries and supplies, 44 per cent; horse feed, 45 per cent; machinery, 50 per cent; freight rates from Dawson to the creeks, 80 per cent; wages, 20 per cent.

The present charge for freighting per ton from Dawson to the creeks is as follows : To Gold Bottom and vicinity, 20 miles, summer, \$15; winter, \$12.50.

	Summer rate.	Winter rate.
To Caribou, 36 miles....	\$ 25	\$ 20
To Granville, 60 miles....	50	30
To Sulphur discovery, 60 miles..	40	30
To Bonanza, 12 miles....	15	10
To Eldorado, 16 miles..	20	15
Quartz, 30 miles....	40	30

The freight rates from Whitehorse to Dawson over the winter trail, 385 miles, is \$300 per ton.

The charge from Pacific coast cities for freighting, Vancouver, Victoria, Seattle, and other Puget Sound cities, by the White pass railway in 100-lb. lots for an ocean haul of 1,000 miles, a rail haul of 112 miles and river haul of 450 miles, is as follows:—

	Class A.	Class B.	Class C.
Under 20,000 lbs. L.C.L..	\$ 3 25	\$ 4 00	\$ 4 75
20,000 lbs. and over, car load lots..	3 00	3 50	4 25

Exceptions to classifications—

- Lumber, rough ½, Class A.
- Lumber, dressed ½, Class C.
- Laths and shingles ½, Class B.

The White Pass tariff in 1902, was as follows :—

	Class A.	Class B.	Class C.
Under 20,000 lbs., less car load lots..	\$ 4 00	\$ 4 50	\$ 5 50
20,000 lbs. and over....	3 75	4 25	5 00

The average cost per ton from Vancouver to Dawson on groceries last season was \$63.75, average cost on hardware, \$63, special rates were made for heavy machinery over 50-ton lots at \$45 a ton. The foregoing tables show the freight rates prevailing in the Yukon. To merchants and shippers elsewhere they will seem very high, most Yukoners claim that they are much too high. Without a knowledge of transportation and a study of the facts of the case it is difficult to say to what degree they are excessive. (Certain it is, however, that a reduction in the freight and transportation rates would be a great boon to the merchants, the mining companies and the individual miner and would very much increase the prosperity of the territory.

PERMANENT WATER SYSTEM.

The future of this camp depends almost entirely on the installation of a water system to supply water to the bench and hillside claims continuously during the summer season.

SESSIONAL PAPER No. 25b

There are over 1,000 bench claims as yet unworked being held by the owners for such a water system to be built.

If water is not supplied to the bench claims within three years it is natural to expect that the miners will leave for new gold fields as the creek claims will by that time have been worked out excepting possibly lower Dominion creek.

The ground will then probably be acquired by large companies, these companies will work a few hundred men in the summer season. This will mean the loss of a market of 5,000 people to Canadian commerce as Yukon's only product is gold, the necessaries of life have to be imported.

The output of gold this year was over \$7,000,000, it is possible next year it will decrease to less than \$5,000,000 as the richest creek claims are being worked out.

Hoping that this information will be useful to you in connection with the report you are preparing on the water system for the Dominion government.

I remain,

Yours sincerely,

(Sgd.) JOHN A. McDOUGAL.

APPENDIX No. 43 TO THE REPORT OF THE SURVEYOR GENERAL.

EXAMINATION PAPERS OF THE BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

FULL EXAMINATION FOR ADMISSION AS ARTICLED PUPIL.

February 13th to 16th, 1906.

XXVII.

PENMANSHIP AND ORTHOGRAPHY.

Correct the following :

Ottawa clames to be a grate sity, becaus it is the fedaral capitol of the grate domineon of Canada. The cite was formelly ocupied by injuns, who romed thru would and dail, hunting bare, beever, martin, minx, and dear, until driven away by kaucasian race. It is difficult to form any concepshun how diferant evverything was then from the pressant time.

The eastern provvines of the domineon are called the maratime provinces ; manitoba is called the paririe provvines ; and ontario the bannar provvince.

Orratery has gone out off voag in parlament thease days

It is ilusury to immagin that coershun is compattable with demmocratic or repper-sentative goverment.

Some peeple shew a diffect in pernuntiasun by illision of one or too leters in a word.

Australea is now a comonwelth. Amongst the fawna we find the emmoo, the cangaru, the deengo and the kasowayrie.

The object of irigasion is to to utelise the watter of streems, rivvers and cricks by first impounding it in resservors and then leeding it by cannals and dittches to the lands that are to be wattered for the benifit of aggericultshure and farm prodducts in general.

Enny atempt at a filosoficle erangment, under kattegorys, of the wurds of our langwidge, must reveel the fact that it is imposibel to seperet and surcumscribe the sevvarrel groops by absollutly distinkt boundry lines. Their will allwis be phownd to egzist, betwean the wurds in won groop and thoes in annuther, a varriety of mewtule Menny wurds, orrigenelly usd to express simpel konsepshuns, are fownd to bee kaypabel with afinnitys, coresponding with simmiler relayshuns among the ideares exprest. perhapps a very slyte moddyphicayshon of meening, of beeing aplide in menny varid asosiashons.

SESSIONAL PAPER No. 25b

ARITHMETIC AND LOGARITHMS.

Marks.

(Time, 3 hours.)

1. Interest at 8 % per annum, payable quarterly, is equal to what rate per cent when paid annually? 11
2. The compound interest on a sum of money, for four years, reckoned yearly, is $\frac{34481}{160000}$ of the sum. Find the rate. 11
3. The numerator of a certain fraction is a fifth as much again as the denominator and the sum of the numerator and denominator is 352. Find the fraction. 11
4. Give and prove rule for recurring decimals. 11
5. Simplify $\left\{ 2\frac{3}{4} + \frac{5}{2} \left(7 \div 3\frac{4}{5} \right) - 1\frac{2}{3} \div 2\frac{1}{2} \right\} \div 1\frac{77}{128}$. 11
6. Give result in vulgar fractions of $(1.30\dot{7} \times .56\dot{0} \times .3\dot{4}) \div (.9\dot{1} \times .0\dot{9} \times 4.1\dot{2})$. 11
7. Find value of $(82)^{\frac{1}{2}} (.13)^{-3} (1.07)^7 (3.5\dot{2})^{\frac{1}{5}} \div (2.17)^{-5} (6.72)^{\frac{1}{6}}$. 11
8. Find the numerical value of Tan A + Sec. B + Cos C when $A = 92^{\circ} 17' 10''$, $B = 111^{\circ} 15' 20''$, $C = 18^{\circ} 40' 30''$. 11
9. The logarithmic cosine of an angle is $9.3520781 n$
 " tangent " $0.8156720 n$
 " sine " 9.8567205
 Find the angles. 12

ALGEBRA.

Marks.

(Time, 3 hours.)

1. Find the G. C. M. of $x^4 - 10x^2 + 9$, $x^4 + 10x^3 + 20x^2 - 10x - 21$ and $x^4 + 4x^3 - 22x^2 - 4x + 21$. 11
2. Find the L. C. M. of $6(a^3 - b^3)(a - b)^3$, $9(a^4 - b^4)(a - b)^2$ and $12(a^2 - b^2)^3$. 11
3. At what time between one and two o'clock is the long hand exactly one minute in advance of the short hand? 11
4. Solve $2x + 3y + 4z = 16$, $3x + 2y - 5z = 8$, $5x - 6y + 3z = 6$. 11
5. Find that number whose square added to its cube is nine times the next higher number. 11
6. Solve $x^3 + y^3 + z^3 = x^2 + y^3 + z^2 = x + y + z = 1$. 11
7. The product of four consecutive numbers is 5040. Find them, and show algebraic process. 11
8. Solve $2 \left(x^{\frac{1}{n}} + x^{-\frac{1}{n}} \right) = 5$. 11
9. Simplify $\frac{a}{b + \frac{c}{d + \frac{e}{f}}}$ 12

6-7 EDWARD VII., A. 1907

PLANE GEOMETRY.

(Time, 3 hours.)

	Marks.
1. Describe a circle about a given triangle.	12
2. Find a mean proportional between two given straight lines.	12
3. Construct a triangle equal to a given rectilineal figure	12
4. Prove geometrically $(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$.	12
5. Describe a circle passing through a given point and touching a given circle at a given point.	13
6. Divide a circle into two segments so that the angle contained in the one shall be equal to twice the angle contained in the other.	13
7. From a given finite straight line to cut off any aliquot part required.	13
8. Find the point the sum of whose distances from the four angular points of a convex quadrilateral is a minimum.	13

PLANE GEOMETRY.

(Time, 3 hours.)

	Marks.
9. To find the side of a square equal to a given rectangle.	14
10. Prove geometrically that in any triangle $a^2 = b^2 + c^2 - 2bc \cos A$.	14
11. Show that similar figures are to each other in the duplicate ratio of their homologous sides.	14
12. Find the locus of the apex of the triangles having a common base and whose sides about the apex have a constant ratio.	14
13. Inscribe a regular hexagon in a given circle.	14
14. Show that the four straight lines bisecting the angles of any quadrilateral form a quadrilateral which can be inscribed in a circle.	15
15. Describe a circle to touch a given straight line, and pass through two given points.	15

PLANE TRIGONOMETRY.

(Time, 3 Hours.)

	Marks.
1. Prove $\tan B = \frac{\sin 2B - \sin B}{1 - \cos B + \cos 2B}$	12
2. Prove $2 \cos \frac{\pi}{8} = \sqrt{2 + \sqrt{2}}$.	12
3. Deduce $\sin^2 \frac{1}{2} A = \frac{(s-b)(s-c)}{bc}$	12
4. If $A + B + C = 180^\circ$, show that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$.	12
5. Show that area of a triangle $= \sqrt{s(s-a)(s-b)(s-c)}$.	13
6. Given $a = 10$, $b = 12$, $c = 14$; find the angles.	13
7. Given $a = 62.4$, $b = 23.5$ and $C = 110^\circ 32'$; find c .	13
8. What is the diameter of the circle circumscribing the triangle with sides 5, 12 and 13 respectively?	13

SESSIONAL PAPER No. 25b

SPHERICAL TRIGOMETRY.

(Time, 3 Hours)

	Marks.
1. Deduce the formula $\cos a = \cos b \cos c + \sin b \sin c \cos A$.	16
2. Show that $\tan^2 \frac{1}{2} a = \frac{\cos S \cos (S - A)}{\cos (S - B) \cos (S - C)}$	16
3. Deduce $\frac{\sin \frac{1}{2} (A + B)}{\sin \frac{1}{2} (A - B)} = \frac{\tan \frac{1}{2} c}{\tan \frac{1}{2} (a - b)}$	17
4. Given $c = 140^\circ$, $a = 20^\circ$, $C = 90^\circ$, solve the triangle.	17
5. Given $b = 99^\circ 40' 48''$, $c = 100^\circ 49' 30''$, $A = 65^\circ 33' 10''$; find a .	17
6. Given $a = 100^\circ$, $b = 50^\circ$, $c = 60^\circ$; find A .	17

MENSURATION OF SUPERFICIES.

(Time, 3 Hours.)

	Marks.
1. The sides of a field are 10.36, 12.42, 14.82 chains, what is the area?	14
2. What would be the diameter of the circle to contain the above area?	14
3. If the river of a drainage basin of 15,000 square miles discharges 750 cubic yards of water per second, and if 25% of the precipitation (rainfall) is lost by evaporation and 30% is absorbed by vegetation, what is the annual rainfall over the drainage basin?	14
4. The ratio of the diameters of the front and hind wheels of a buggy is as 7 to 9, and the circumference of two (one front and one hind) of them is 40 feet. How many revolutions do they respectively make in going over a mile?	14
5. The edge of a tetrahedron is 10 inches; what is the diameter of the sphere having the same surface as the tetrahedron?	14
6. A pyramid with square base, 14 inches to the side and 10 inches high, is converted into a cylinder, whose length is twice its diameter. What are the dimensions of the cylinder and its surface?	15
7. A regular hexagon was laid out to contain 10 acres, but it was afterwards found that the chain that was used was half a link too long. What is the true area of the hexagon as laid out?	15

LIMITED EXAMINATION FOR ADMISSION AS ARTICLED PUPIL.

XIV.

FEBRUARY 13TH, 1906.

FIRST PAPER.

(Time, 3 hours.)

<i>(Time, 3 hours.)</i>		Marks.
1. Write out and correct the paper herewith	{ Penmanship.	10
	{ Orthography.	40
2. Find the value of 38·372 into 81·046 divided by 3·87 into 40·367.		6
3. Give and prove rule for recurring decimals.		6

4. Find the value of $(3 \cdot 17)^{\frac{1}{2}} \cdot (4 \cdot 86)^{\frac{1}{3}} \cdot (.072)^{-\frac{1}{3}}$
divided by $(.085)^6 \cdot (3 \cdot 402)^3 (8 \cdot 764)^{-4}$ 6
5. What power of $7 \cdot 13$ is 5, and $.023$ of $1 \cdot 16$? 6
6. Simplify $\frac{\frac{m^2 + n^2}{n} - m}{\frac{1}{n} - \frac{1}{m}} \times \frac{m^2 - n^2}{m^3 + n^3}$ 6
7. Prove geometrically $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$. 6
8. Construct a triangle having given the base, the vertical angle and the altitude. 7
9. Solve $x - 2 \sqrt{x^2 + x + 5} - 14 = 0$ and $x^{-1} + x^{-\frac{1}{2}} = 6$. 7

PENMANSHIP AND ORTHOGRAPHY.

The same paper as in No. XXVII, of the Full Examination for Admission as Articled Pupil.

SECOND PAPER.

(Time, 3 hours).

- | | Marks. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 10. If $\tan B = \frac{b}{a}$, prove that $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}} = \frac{2 \cos B}{\sqrt{\cos 2B}}$ | 11 |
| 11. Prove $\frac{\sin 2\theta + \sin \theta}{\cos \theta + \cos 2\theta} = \tan \frac{3\theta}{2}$ | 11 |
| 12. Prove that in any triangle
$\frac{\cos 2A}{a^2} - \frac{\cos 2B}{b^2} = \frac{1}{a^2} - \frac{1}{b^2}$ | 11 |
| 13. Given $a = .062387$, $b = .023475$, $C = 110^\circ 32'$. Find B and C . | 11 |
| 14. Deduce one of Napier's analogies. | 11 |
| 15. Given $b = 99^\circ 40' 48''$, $c = 100^\circ 49' 30''$, $A = 65^\circ 33' 10''$. Find a . | 11 |
| 16. Given $c = 101^\circ 16' 17''$, $b = 115^\circ 42' 38''$, $C = 90^\circ$; find A . | 11 |
| 17. A metallic tetrahedron, edge a , is converted into a sphere; what is its diameter and surface? | 11 |
| 18. A hemispherical dome has a surface of 1,200 sq. feet. What is the diameter of the base of a right cone, having the same surface and whose height is equal to the diameter of the dome? | 12 |

SESSIONAL PAPER No. 25b

XV.

February 22nd, 1906.

FIRST PAPER.

Marks.

(Time, 3 hours.)

- | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------|
| 1. Write out and correct the paper herewith. | { Penmanship.
Orthography. | 10
40 |
| 2. Find the value of $14\cdot7\ddot{6}2 + 3\cdot5\ddot{4}9$ and $2\cdot20\ddot{4} \div \cdot4\ddot{2}$. | | 9 |
| 3. Which of the following statements is more nearly correct
$\frac{10}{9\cdot009} = 1\cdot11$ or $\frac{10}{1\cdot11} = 9\cdot009$? | | 9 |
| 4. Find the fifth root of $2785\cdot02$ and of $\cdot013587$. | | 9 |
| 5. If the unit of measure be 5 inches, what is the measure of $\frac{5}{374}$ of a mile. | | 9 |
| 6. Solve $nx^3 + x + n + 1 = 0$. | | 9 |
| 7. Prove geometrically $(2a - b)^2 + b^2 = 2(a + b)^2 + 2a^2$. | | 9 |
| 8. The sum of the perpendiculars drawn from any point within an equilateral triangle on the three sides is constant. | | 9 |

SECOND PAPER.

(Time, 3 hours.)

Marks.

- | | |
|-----------------------------------------------------------------------------------------------------------------------------|----|
| 9. Prove $\sin 3A = 3 \sin A - 4 \sin^3 A$. | 9 |
| 10. Prove that $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3} = 45^\circ$. | 9 |
| 11. Deduce $\sin A = \frac{2}{bc} \sqrt{s(s-a)(s-b)(s-c)}$. | 9 |
| 12. Express $\cos 5\theta$ in terms of $\cos \theta$. | 10 |
| 13. Given the sides 7 chs. and 8 chs., and the included angle 38° find remaining side. | 10 |
| 14. Deduce $\cos a = \cos b \cos c + \sin b \sin c \cos A$. | 10 |
| 15. In a spherical triangle $A = 57^\circ 10'$, $B = 86^\circ 34'$, $C = 96^\circ 26'$ find a . | 10 |
| 16. Give formulae for finding remaining parts of a spherical triangle, when the two sides and the included angle are given. | 10 |

6-7 EDWARD VII., A. 1907

XVI.

MAY 3rd, 1906.

(Time, 3 hours.)

	(Time, 3 hours.)	Marks.

1. Write out and correct the paper herewith.	{ Penmanship.	10
	{ Orthography.	40
2. Give and prove the rule for recurring decimals.		6
3. Find the value of $(1\cdot0\ddot{9}) + (3\cdot4\ddot{0}9) - (2\cdot41\ddot{0}9)$.		6
4. Find value of $(3\cdot14)^{\frac{1}{2}} (5\cdot16)^{\frac{2}{3}} (7\cdot22)^{-\frac{3}{5}} (8\cdot20)^{\frac{4}{5}}$		6
5. A sum of money trebles itself at compound interest in ten years. What is the rate of interest.		6
6. Solve $\frac{x}{2} + \frac{2}{x} = \frac{x}{3} + \frac{3}{x}$ and $\frac{x}{7} + \frac{21}{x+5} = \frac{23}{7}$		6
7. A metallic sphere 10 inches in diameter is converted into a hollow cylinder 10 inches long, and a quarter of an inch thick. What is its inside diameter?		6
8. Prove geometrically $a^2 = b^2 + c^2 - 2 bc \cos A$.		6
9. Divide a given straight line in extreme and mean ratio.		6
10. Two diagonals of a regular pentagon which meet within the figure divide each other in extreme and mean ratio.		6
11. If two circles intersect each other, their common chord bisects their common tangents.		6

PENMANSHIP AND ORTHOGRAPHY.

(Time, 3 hours.)

Marks.

Correct the following:—

We awl know thet servaying is a purty good bussines wen the man can servay rite ekspeedeeteously. He must be able to supstract koreckty and separate rite from rong without suspishun of koershun.

The sensation of sownd is not comparible with enny of our other sensations. Verry curcery observashun offen sufices to shew that sownding boddies are in a staite of viberasion. Sutch a fenommanon we see in the tuning fork and voiolin of fidle string.

In the maratine provinces the abburigenes were injuns, who were dresed in cloathes maid of the skins of dear and karriboo. On there feat they wore mokkasens and tied a martin skin to there long hair for ornament. From the bertch tree they got barque for there kannoos, and gatthered the nuts from the beoch tree too eat on the beach beside the rappid running stream in which were stones and big bolders of grannit and nice; the latter is a petickuler kind of grannit with the mika in layurs.

Every wurkimin in the eggsercize off the art shood bee perveided withe propper implimence. Four the fabbrikashon of komplekeighted and kureus peacis off meccannism, the artti en rechoirs a corispounding assortmeant of vairius twols and instroomence. Four givving proppar efect to the fixions off the drammer the acter shood haf att his dispowsel a well-furnisht wardrowbe, supliing the kostooms best sewted two the personidges he is to repprezent.

SESSIONAL PAPER No. 25b

(Time, 3 hours.)		Marks.
12. Prove $\cos 54^\circ = \frac{1}{4} \sqrt{(10 - 2\sqrt{5})}$.		10
13. Prove $\tan \frac{1}{2} A = \sqrt{\frac{(S-b)(S-c)}{S(S-a)}}$		10
14. The elevation of a tower is 40° from a given point. From another point, lying on the straight line from the former point to the tower, the elevation is 50° . The points of observation are 200 feet apart. How high is the tower?		10
15. In a plane triangle $a = 15^{\text{ch.}} \cdot 16$, $b = 18^{\text{ch.}} \cdot 24$, $C = 38^\circ 24'$; find c .		10
16. Show that $\tan^{-1} A + \tan^{-1} B = \tan^{-1} \frac{A+B}{1-AB}$		10
17. Show that $\cos a \sin b = \sin a \cos b \cos C + \sin c \cos A$.		40
18. Given $c = 110^\circ 46' 20''$, $A = 80^\circ 10' 30''$; $C = 90^\circ$. Solve the triangle.		10
19. Given $A = 135^\circ 5' 29''$, $C = 50^\circ 30' 8''$, $b = 69^\circ 34' 56''$, find B .		10

FULL EXAMINATION FOR ADMISSION AS SURVEYOR.

XXXV.

FEBRUARY 13TH TO 19TH, 1906.

PLANE GEOMETRY.

(Time, 3 hours.)		Marks.
1. Inscribe a circle in a given triangle.		18
2. Prove geometrically $(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$.		18
3. Of all triangles having the same vertical angle and the same area, prove that the isosceles triangle has the shortest base.		19
4. In a circle $BAEF$, with centre C , FCE is a diameter, and BCA a right angle. A perpendicular AD is let fall from A on FE , making CD equal to the arc AE . Show that the segment BAE equals one quarter of the area of the circle.		19
5. The rectangle contained by the diagonals of a quadrilateral inscribed in a circle is equal to the sum of the rectangles contained by pairs of opposite sides.		19
6. Construct a triangle having each of two angles double of the third angle.		19
7. Divide a given finite straight line into two parts so that the squares on them shall be to one another in a given ratio.		19
8. Find the centre of a circle cutting off three equal chords from the sides of a triangle.		19

6-7 EDWARD VII., A. 1907

SOLID GEOMETRY.

Marks.

(Time, 3 Hours.)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Define: Pyramid, frustum of cone, parallelopiped, inclination of a plane to a plane, tetrahedron, icosahedron, polyhedral angle. | 9 |
| 2. If two planes meet in a point, they meet in a straight line. | 9 |
| 3. Show how to draw through a given point a straight line to intersect two non-intersecting straight lines. | 9 |
| 4. Every point, which is equidistant from two fixed points, lies in a fixed plane. | 9 |
| 5. If three straight lines intersect each other in pairs, they meet at a point or lie in a plane. | 9 |
| 6. A tetrahedron, of gold, edge 10 inches, is rolled into gold-leaf one-thousandth of an inch in thickness. What is the diameter of the sphere that will just be covered by the gold-leaf? | 10 |
| 7. A cube, a tetrahedron and a sphere have each the same volume, V . Find side, edge and diameter respectively; also the surface of each. | 10 |
| 8. A right cylinder, whose length is twice its diameter, has a total surface of 100 sq. inches. What are the dimensions of a right cone, whose height is the length of the cylinder, and whose surface is 100 sq. inches? | 10 |

SPHERICAL TRIGONOMETRY.

Marks.

(Time, 3 Hours.)

- | | | |
|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----|
| 1. Prove | $\frac{\tan \frac{1}{2} A}{\tan \frac{1}{2} B} = \frac{\sin (s-b)}{\sin (s-a)}$ | 17 |
| 2. Show that | $\sin b \sin c + \cos b \cos c \cos A = \sin B \sin C - \cos B \cos C \cos a.$ | 18 |
| 3. Give and prove Napier's rules. | | 18 |
| 4. Deduce | $\sin^2 \frac{1}{2} A = \frac{\sin (s-b) \sin (s-c)}{\sin b \sin c}.$ | 18 |
| 5. Given $c = 101^\circ 16' 17''$, $b = 115^\circ 42' 38''$; find A , C being 90° . | | 18 |
| 6. Given $A = 135^\circ 05' 29''$, $C = 50^\circ 30' 08''$, $b = 69^\circ 34' 56''$; find a and B . | | 18 |
| 7. Given $A = 120^\circ$, $B = 130^\circ$, $C = 80^\circ$; find c . | | 18 |

SESSIONAL PAPER No. 25b

MEASUREMENT OF AREAS AND SUBDIVISION OF LAND.

Marks.

(Time, 3 hours.)

1. Divide a triangle into two parts in the ratio of $m : n$ by a straight line passing through a given point within the triangle. 16
2. A field is enclosed by three sides, 10, 12 and 14 chains long respectively. It is bisected by a line parallel to the longest side. What is the length of the bisecting line and how far is it from the centre of the inscribed circle? 16
3. The centre line of a railway enters the west side of S. 31, T. 24, R. V., W. of 2nd M., 20.56 chains south of the N.W. corner of the section, from a tangent running N. 30° E., and continues on a curve of 3,500 ft. radius across the section. The right of way extends 50 feet on each side of the centre line. How much of the section lies north of the railway? 17
4. What parallel of latitude bisects the area of the north temperate zone? 17
5. In question 3, if the tangent had continued across the section and the width of the right of way remained the same, what is the area of the section lying south of the railway? 17
6. In question 5, what is the azimuth of the line, starting at the S. E. corner of the section that bisects the part of the section lying south of the railway? 17

MEASUREMENT OF AREAS AND SUBDIVISION OF LAND.

Marks.

(Time, 3 hours.)

7. The following are the notes of a survey of a quadrilateral piece of land :

STATIONS.	BEARINGS.	DISTANCES.
1	N. 54° 00' E.	15.94 chains.
2	S. 27° 45' E.	6.15 "
3	S. 33° 45' W.	11.53 "
4	N. 59° 00' W.	10.70 "

Find the area by the method of Latitudes and Departures, first "balancing" the survey. 40

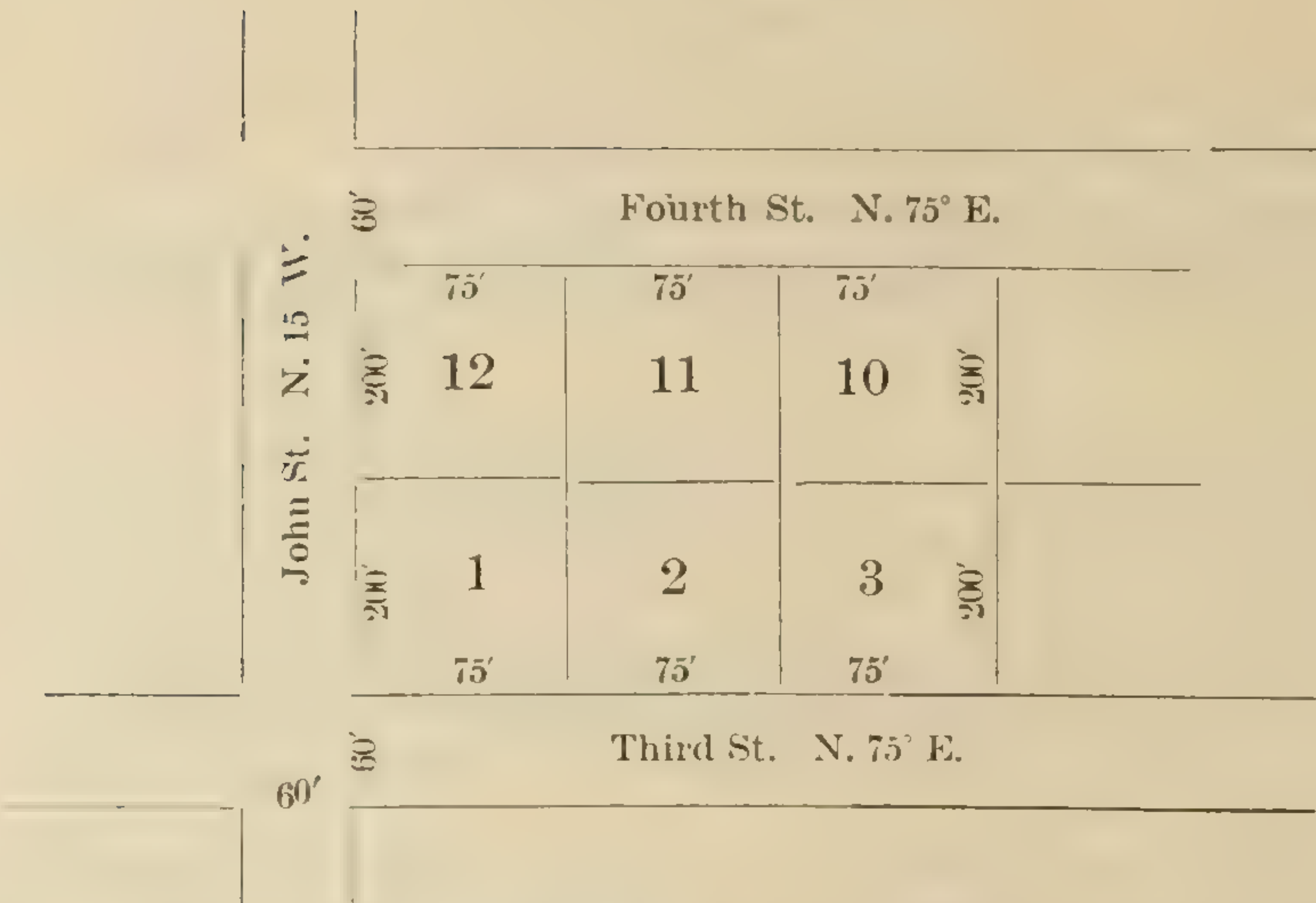
8. Express the conditions necessary for a closed survey by two equations.
 - (a) And from them show what missing data in a survey can be supplied.
 - (b) How does the supplying of missing data in a survey affect "balancing" the survey? 20
9. Give full explanation and deduction of the method of computing areas by "latitudes and departures." 20
10. If in question 7, the chain was a link too long, and each azimuth, reckoned from the north through the east, was too great by fifteen minutes, what is the true area of the quadrilateral? 20

DESCRIPTIONS.

(Time, 3 hours.)

Marks.

1.



- The above is part of the registered plan of the town of Holly in the County of Tweed and Province of Alberta. *A* sells to *B* a part of lot No. 1, and adjoining John and Third streets. The part sold is to have a frontage of forty feet on Third street to extend to the rear of the lot and the dividing line to be parallel to John street. Make a description for a deed. 25
2. Using the plan of question 1. Supposing *A* to own lots 1 and 2, he sells lot No. 2 to *B*, and gives the right of ingress and egress to *B* by a lane, 16 feet wide, running along the whole of the rear limit of lot No. 1. Make the necessary description for the conveyance. 25
3. Moose Creek flows across the N.E. $\frac{1}{4}$ S, 12, T. 13, R. 15 W. in an easterly direction. *B* desires to buy the northerly part of the quarter section lying north of the creek, together with the creek. From measurement the southerly bank of the creek intersects the eastern and western quarter section lines respectively at 22^{ch}. 12 and 20^{ch} 18 from the northern quarter section line. The whole area to be conveyed is supposed to contain 85 acres.. Make a description for a deed. 25
4. Make a description for the remaining part of the quarter section given in question 3. 25

ASTRONOMY.

(Time, 3 hours).

Marks.

1. Define—declination, right ascension, celestial latitude and longitude, first point of Aries, parallactic angle, dip, parallax and elongation. 14
2. Explain fully the equation of time why it varies and when it is a maximum. A diagram is desirable. 14
3. In latitude 45° 25' N., longitude 75° 42' W., what is the standard time on June 30th, 1904, of eastern elongation of Polaris, declination 88° 48', right ascension 1^h 25^m 08^s? 14
4. At the same date and place as in question 3, what is the time of sun-rise? Semi-diameter, refraction and parallax to be considered. 14

SESSIONAL PAPER No. 25b

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 5. At same date and place as above what is the hour angle of Arcturus (<i>a</i> Boötis) when on the prime vertical? | 14 |
| 6. On June 20th, 1904, the altitude of the lower limb of the sun at its lower or northern culmination was $10^{\circ} 13' 45''$. What is the latitude of the place? | 15 |
| 7. The observed altitude of Arcturus on June 30th, 1904, when on the prime vertical was $46^{\circ} 32'$. What is the latitude of the place? | 15 |

ASTRONOMY.

Marks.

(Time, 3 hours.)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 8. On June 20, 1904, in latitude $45^{\circ} 25' N.$, longitude $75^{\circ} 42' W.$, the observed altitude of the sun's upper limb at $8^h 40^m 13^s$ watch time was $48^{\circ} 16' 30''$. What was the watch correction, and what was the azimuth of the sun. | 20 |
| 9. In question 8 what was the true local sidereal time of observation? | 20 |
| 10. At noon on June 20, 1904, a sidereal chronometer is fast on the local sidereal time $2^h 17^m 49^s.76$, it gains $2^s.46$ a day. At another place to the west a sidereal chronometer is slow, at the above time and day, on the local sidereal time there $1^h 27^m 38^s.92$, and loses $3^s.84$ per day. | 20 |
| At noon on July 1 following a telegraphic comparison between the two chronometers showed the first one to be ahead of the second $6^h 22^m 17^s.64$. what is the difference of longitude of the two places? | 20 |
| 11. In latitude $45^{\circ} 25' N.$, longitude $75^{\circ} 42' W.$, at what time will Arcturus set June 20, 1904; and what is the standard time of its passing the meridian? | 20 |
| 12. Assuming the declination of Polaris as $88^{\circ} 48'$, what are the greatest and least azimuths at elongation it can have, and what are the corresponding latitudes on the earth for such azimuths? | 20 |

MANUAL OF SURVEY.

FIRST PAPER.

(Time, 3 hours.)

Marks.

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Describe the third system of survey of Dominion Lands. How are townships designated by numbers? How are sections and their legal subdivisions numbered? | 15 |
| 2. Show in what the first, second and fourth systems of survey differ from the third.
State what territory is covered by each system of survey.
How may two townships have the same numbers? How are they distinguished? | 15 |
| 3. What instruments are to be used in a sub-division survey? How and with what is the linear measurement determined on a survey? What precautions are to be taken in making the measurements? How are obstacles to be passed, such as swamps or rivers or inaccessible hills? | 15 |
| 4. Describe fully the different kinds and sizes of posts, iron tubes, mounds, pits and trenches used in the present system of survey. Show how and where they are placed. Distinguish between the monuments for open and wooded country. | 15 |

5. How would you mark the following posts :—

- (a) At the north corner between sections 22 and 23, Tp. 51, R. 7, East of the P.M.
- (b) At the township corner between ranges 8 and 9, on the Base line West of the 3rd M.
- (c) At the south corner between sections 2 and 3, Tp. 15, R. 13, West of the 4th M.
- (d) At the N.E. corner of section 8, Tp. 27 A, R. 14, W. of 2nd M. (on the south side of the road allowance dividing two systems of survey).
- (e) At the north corner Tp. 54, between ranges 17 and 18. 15

6. What is a group lot and what are the rules governing its survey? How is a settlement surveyed? How is a highway surveyed?

7. Define a bearing and an azimuth. To what meridian is a bearing referred and how is it deduced from an observed azimuth?

MANUAL OF SURVEY.

SECOND PAPER.

(Time, 3 hours.)

Marks.

- 8. How are the North and the South boundaries of a township surveyed? Describe fully the process of sub-dividing a township in the present system of survey. When is a quarter section considered as sufficiently surveyed for disposal? What are the limits of error allowed in a sub-division survey? 15
- 9. What is to be entered in the field book? How are section lines described in it? What information is entered upon a plan and to what degree of approximation are areas given on it? What is the date of a survey? 15
- 10. What are the bodies of water in a township which have to be surveyed? In what manner are they surveyed? How are the returns of the traverses made? Give the rules governing the rights of riparian owners. 20
- 11. Define a resurvey, a retracement survey, a restoration survey, an obliterated monument and a lost monument. Give the rules governing the above surveys. Under what circumstances is a subdivider justified in resurveying or retracing a township outline? 20
- 12. Distinguish between regular and fractional sections and give the respective methods of sub-dividing them into their legal sub-divisions. The N. E. corners of sections 21, 28, 32, 33 and 34 in Tp. 6 West of the 3rd M., together with all the intervening $\frac{1}{4}$ section marks have disappeared. How would you proceed to re-establish these corners? 15
- 13. How would you summon a person to give evidence before you regarding the position of a corner or boundary? How would you proceed if he failed to appear before you at the time specified? 15

SESSIONAL PAPER No. 25b

ADDITIONAL PAPER FOR CANDIDATES WRITING UNDER CLAUSES 109 AND 110 OF THE
DOMINION LANDS ACT.

ALGEBRA.

(Time, 3 hours.)

	Marks.
1. If $a = 1$, $b = \frac{2}{3}$, $x = 7$, $y = 8$, find the value of $5(a - b) \sqrt[3]{\{(a + x)y^2\} - b \sqrt{\{(a + x)y\}} + a$	10
2. Find the G. C. M. of $x^5 - y^5$ and $x^2 - y^2$, and the L. C. M. of $x^3 - x$, $x^3 - 1$, $x^3 + 1$.	10
3. Simplify $\frac{x^2 - 3x - 4}{x^2 - 4x - 5}$ and $\frac{(x + y)^7 - x^7 - y^7}{(x + y)^5 - x^5 - y^5}$	10
4. Solve $\frac{6x + 1}{15} - \frac{2x - 4}{7x - 16} = \frac{2x - 1}{5}$.	10
5. Find the value of $\frac{x - a}{b} - \frac{x - b}{a}$ when $x = \frac{a^2}{a - b}$	10
6. Solve $\frac{x}{x - 1} = \frac{3}{2} + \frac{x - 1}{x}$	10
7. Solve $x - 2 \sqrt{x^2 + x + 5} - 14 = 0$	10
8. Solve $x^2 + xy - 6y^2 = 24$, $x^2 + 3xy - 10y^2 = 32$	10
9. The product of four consecutive odd numbers is 9009. Find them.	10
10. What are eggs a dozen when two more in a shilling's worth lowers the price one penny per dozen?	10

XXXVI

MAY 1ST TO 7TH, 1906.

PLANE GEOMETRY.

(Time, 3 Hours.)

	Marks.
1. Prove that the interior angles of a triangle are together equal to two right angles.	15
2. Construct a right-angled triangle having given the hypotenuse and the sum of the sides.	15
3. If the square on one side of a triangle be equal to the sum of the squares on the other sides, the angle contained by these two sides is a right angle.	15
4. If the sum of the squares on two opposite sides of a quadrilateral be equal to the sum of the squares on the other two sides, the diagonals of the quadrilateral intersect at right-angles.	15
5. Prove geometrically $a^2 = b^2 + c^2 - 2bc \cos A$.	15
6. The base of a triangle is given: find the locus of the vertex when the sum of the squares on the two sides is given.	15
7. Escribe a circle beyond one of the sides of a triangle.	15
8. Similar polygons are to one another in the ratio duplicate of the ratio of two corresponding sides.	15
9. If a straight line be drawn from each corner of a square to the nearer point of trisection of the next side of a square in order, so as to form a square, this square will be two-fifths of the original square.	15
10. Describe a circle passing through a given point and touching a given circle at a given point.	15

6-7 EDWARD VII., A. 1907

SOLID GEOMETRY.

Marks.

(Time, 3 Hours.)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. If one of three concurrent straight lines be at right angles to the other two, the first is at right angles to the plane through the others. | 9 |
| 2. Equal straight lines drawn from a given point to a given plane, are equally inclined to the plane. | 9 |
| 3. Through a given point draw a plane at right angles to a given straight line. | 9 |
| 4. Prove that if two spheres intersect their curve of section is a circle. | 9 |
| 5. Draw a plane to bisect the dihedral angle between two given planes at a given point in their common section. | 9 |
| 6. What is the edge of a regular tetrahedron whose volume is that of a sphere, radius r ? | 10 |
| 7. Describe (geometrically) a sphere about a given tetrahedron (not regular). | 10 |
| 8. A metallic right cylinder, length l , radius r , and a regular tetrahedron edge p , are converted into a sphere. What is the surface of the latter? | 10 |

SPHERICAL TRIGONOMETRY.

Marks.

(Time, 3 hours.)

- | | |
|-----------------------------------------------------------------------------------------------------------------|----|
| 1. Deduce $\tan \frac{1}{2} (a+b) = \frac{\cos \frac{1}{2} (A-B)}{\cos \frac{1}{2} (A+B)} \tan \frac{1}{2} c$. | 17 |
| 2. Give and prove Napier's rules. | 18 |
| 3. Deduce $\sin \frac{1}{2} A = \frac{\sin (s-b) \sin (s-c)}{\sin b \sin c}$ | 18 |
| 4. Given $A = 100^\circ$, $a = 112^\circ$, $C = 90^\circ$ solve the triangle. | 18 |
| 5. Given $A = 135^\circ 05'$ $C = 50^\circ 30'$ $b = 69^\circ 35'$ find a . | 18 |
| 6. Given $b = 120^\circ 30'$ $c = 70^\circ 20'$ $A = 50^\circ 10'$ find a . | 18 |
| 7. Given $A = 120^\circ$ $B = 130^\circ$ $C = 80^\circ$ find c . | 18 |

MEASUREMENT OF AREAS AND SUB-DIVISION OF LAND.

Marks.

(Time, 3 hours.)

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Divide a triangular piece of land in a given ratio by a straight line parallel to one of the sides. | 16 |
| 2. Divide a triangular piece of land in a given ratio by a straight line passing through a given point within the triangle. | 16 |
| 3. In a triangular field AB is 13 ch., BC is 14 ch. and CA is 15 ch. From a point in BC and 5 ch. from B a straight line is run to AC so as to cut off a triangle 3 ac. in area. What is the length of the dividing line? | 17 |
| 4. If we take a catchment basin on the east slope of the Rocky Mts. 400 miles long and 100 miles wide, the annual precipitation at 25 inches of which 40% is lost by evaporation and vegetable absorption and 1% of the out-flow by rivers is impounded in reservoirs, how many acres can be irrigated if it requires a total of 10 inches in depth on the land for the year for irrigation? | 17 |
| 5. What parallel of latitude divides the Arctic Zone into equal areas. | 17 |
| 6. Divide a given quadrilateral into two parts in the ratio of m to n by a straight line running from a given point in one of the sides. | 17 |

SESSIONAL PAPER No. 25b

MEASUREMENT OF AREAS AND SUBDIVISION OF LAND.

(Time, 3 hours.)

Marks.

7. The notes of the survey of a piece of land are as follows :

- | | |
|------------------|----------------------|
| 1. N. 52° 00' E | 10·63 ^{ch.} |
| 2. S. 29° 45' E. | 4·10 ^{ch.} |
| 3. S. 31° 45' E. | 7·69 ^{ch.} |
| 4. N. 61° 00' W. | 7·13 ^{ch.} |

Required the area after first balancing the survey.

40

8. (a) Express the conditions necessary for a closed survey by two equations.

(b) Show what missing data may be supplied and whether any ambiguity may arise.

(c) How does the supplying of missing data affect balancing the survey ?

20

9. Deduce the method of computing areas by latitudes and departures.

20

10. With an iron chain the sides of a quadrilateral were found to be $AB = 10·64^{ch.}$, $BC = 4·09^{ch.}$, $CD = 7·68^{ch.}$ and $DA = 7·24^{ch.}$, and the area 4·93 acres. Subsequently by means of a standard steel tape the area was found to be $5·17^{ac.}$ What is the true length of the side AB ?

20

DESCRIPTIONS.

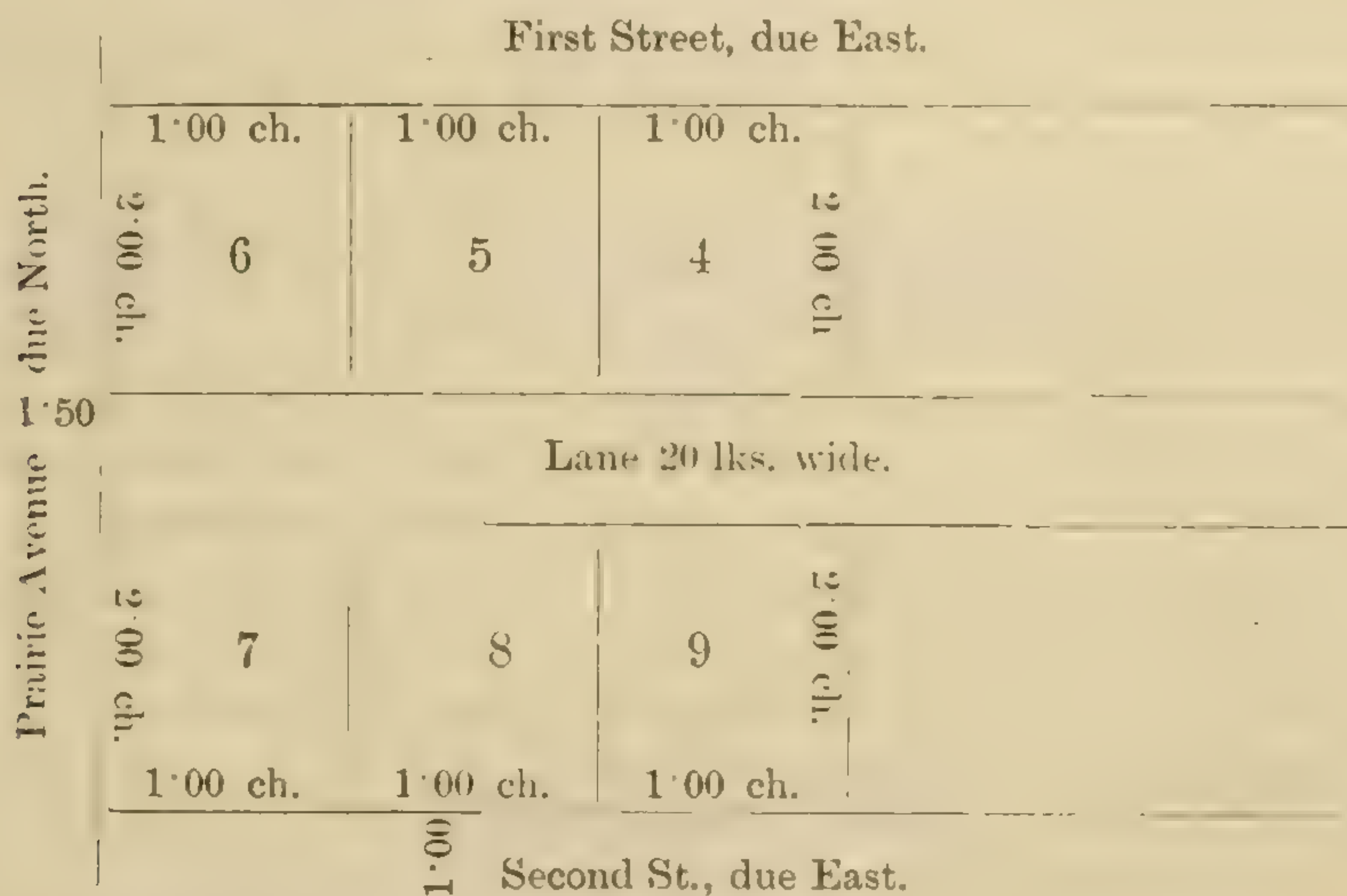
(Time, 3 hours.)

Mark.

1. In registered and certified plan the measurements and bearings of all lines are given, each lot is numbered and shown as being one chain wide and two long. Make a description of one of the lots for a deed of bargain and sale.

20

2. The following is a part of a registered and certified plan ; the owner of lot No. 7, sells 40 feet frontage on Second street, and adjoining Prairie Avenue, and this width to extend to the lane.



Make a description by metes and bounds of the part sold.

20

3. The owner of the S.E. $\frac{1}{4}$ sec. 4, Tp. 5, R. 4, W. of 2nd I M, sells the southerly 100 acres thereof, the boundaries to be the southern boundary of the $\frac{1}{4}$ sec., the eastern and western ones, and a line parallel to the southern boundary. Give description of the part sold, by metes and bounds.

20

6-7 EDWARD VII., A. 1907

4. Through Sec. 21, Tp. 8, R. 6, W. of 2nd, 1 M, flows a stream westward. The owner of the section sells the eastern half (two $\frac{1}{4}$ sections) but reserves the privilege of 'swelling' the water and of access along the banks of the stream for the purposes of repair of banks in that half of section 21. Make description of part sold for a deed. 20
5. Draw up an assumed evidence, and, which is of value of a witness regarding the lost post of a section corner, which it is desired to re-establish. 20

ASTRONOMY.

Marks.

(Time, 3 Hours.)

1. Define, right ascension, declination, celestial latitude and longitude, solar mean and sidereal time, parallax, and parallactic angle. 12
2. Explain fully the equation of time and its variation. A graphical representation is desirable. 12
3. On May 10, 1904 in latitude $45^{\circ} 25'$, longitude $75^{\circ} 42' W.$, what is the standard time of eastern elongation of Polaris? 12
4. On July 1, 1904, the altitude of the lower limb of the sun at lower or northern culmination was $10^{\circ} 17'$; what was the latitude of the place of observation? 12
5. What is the standard time for same date and place as in question 3 of Arcturus (α Boötis) crossing the prime vertical? 13
6. What is the sidereal time for same date and place as in question 3, when the azimuth, reckoned from north through east, of Rigel (β Orionis) is 225° ? 13
7. On May 10, 1904, the meridian altitude of Spica (α Virginis) was $83^{\circ} 17'$ from the north horizon. What was the latitude of the place? 13
8. On same date and place as in question 3, when the hour angle of the sun in the forenoon is $37^{\circ} 15'$, what is the local mean time at a place whose longitude is $34^{\circ} 28' E.$? 13
9. On May 10, 1904, in latitude $45^{\circ} 25'$ longitude $75^{\circ} 42' W.$ the altitude of the sun's lower limb was observed to be $32^{\circ} 15'$ at $8^h 46^m 37^s$. What was the azimuth of the sun and the watch correction? 20
10. On same date as above, the altitude of Arcturus when on the prime vertical was $72^{\circ} 15'$. What was the latitude of the place and the local sidereal time of observation? 20
11. At noon on May 10, 1904, a sidereal chronometer is fast on local sidereal time $1^h 17^m 28^s \cdot 76$, it loses $2^s \cdot 78$ daily. At another place to the east a sidereal chronometer is slow at the above time and day, on the local sidereal time there $2^h 14^m 35^s \cdot 94$ and gains $3^s \cdot 17$ a day. At noon on June 1 following a telegraphic comparison between the two chronometers showed the first to be behind the second $5^h 17^m 23^s \cdot 42$. What is the difference of the longitude between the two places? 20
12. In question 9 what is the standard time of sunrise, semi-diameter, refraction, and parallax to be considered? 20
13. On May 10, 1904, in longitude $75^{\circ} 42'$, the standard time of sunrise was $5^h 12^m$. What was the latitude of the place? 20

SESSIONAL PAPER No. 25b

MANUAL OF SURVEY.

FIRST PAPER.

*(Time, 3 hours.)*Marks.

1. Define an initial meridian, a base line, and a correction line. Where are the initial meridians? How are townships and ranges numbered? 20
2. Describe the different kinds of posts, mounds, pits and trenches used in the present system of survey. Show how and where they are placed. 20
3. How would you mark the following posts :
 - (a.) At the corner between Sections 20, 21, 28 and 29, Tp. 33, R. 12, east of the P. M.
 - (b.) At the north corner between Sections 4 and 5, Tp. 30, R. 3, W. of the 4th M.
 - (c.) At the N. W. corner of Section 1, Tp. 45, R. 21 A., W. of 2nd M. (on the east side of the road allowance dividing two systems of survey).
 - (d.) At the north corner of Tp. 70 between ranges 11 and 12, W. of 2nd M.
 - (e.) At the witness mound placed at a distance of 3 chains south of the N. E. corner of Section 15, Tp. 25, R. 17, W. of the 4th M. 20
4. How is a settlement surveyed? Give the rules to be observed in measuring a distance by means of a triangle. 20
5. Define a bearing and an azimuth. To what meridian is a bearing referred in subdividing a township and how is it deduced from an observed azimuth? 20

MANUAL OF SURVEY.

SECOND PAPER.

*(Time, 3 hours.)*Marks.

6. How are the north and the south boundaries of a township surveyed?
When is a quarter section considered sufficiently surveyed for disposal?
What are the limits of error allowed in a subdivision survey? 20
7. What is to be entered in the report made by a surveyor on the subdivision of a township? What is the date of a survey? 20
8. What are the bodies of water in a township which have to be surveyed, and what are those which are not to be surveyed?
In what manner is a traverse made?
Give the rules governing the rights of riparian owners. 20
9. Define, a resurvey, a retracement survey, a restoration survey, an obliterated monument, and a lost monument. Give the rules governing the above surveys. Under what circumstances is a subdivider justified in resurveying or retracing a township outline? 20
10. All the section and quarter section corners around sections 4 and 9, township 35, range 28, W. of 2nd M. are lost, but the positions of the adjoining corners are known. How would you proceed to re-establish the lost corners?

EXAMINATION FOR DOMINION TOPOGRAPHICAL SURVEYOR.

IX.

FEBRUARY 13TH TO 21ST, 1906.

ALGEBRA.

(Time, 3 hours.)

Marks.

1. Find the greatest numerical values without regard to sign which the expression $(x-8)(x-14)(x-16)(x-22)$ can have for values of x between 8 and 22. 8
2. If n harmonic means be inserted between two positive quantities a and b , the difference between the first and last of these means bears to the difference between a and b , a ratio less than $n-1:n+1$. 8
3. Prove that the product of the numbers denoted by 10, 11, 12, 13, increased by 1 will be the square of the number denoted by 131 whatever be the scale of notation. 8
4. The number of permutations of n different letters taken all together in which no letter occupies the same place as in a certain given permutation is

$$n \left\{ \frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \dots + \frac{(-1)^n}{n} \right\}$$
 8
5. If $n-1$ and $n+1$ be both prime numbers >5 , n must be one of the forms $30t$, or $30t \pm 12$, and $n^2(n^2+16)$ will be divisible by 720. 9
6. From a large number of balls, each equally likely to be white or black, $p+q$ being drawn turn out to be p white and q black: prove that if it is an even chance that, on three more balls being drawn two will be white and one black

$$\frac{p}{q} = 1 + \sqrt[3]{2}, \text{ nearly, } p \text{ and } q \text{ being both large.} \quad 9$$

PLANE TRIGONOMETRY.

(Time, 3 hours.)

Marks.

1. Solve the equation $\tan^2 2x + \tan^2 x = 10$. 8
2. Prove that $\cot \frac{\theta}{2} > 1 + \cot \theta$, for values of θ between 0 and π ; and that, for all values of θ , $\frac{3 \sin \theta}{\theta} < 2 + \cos \theta$. 8
3. The line joining the middle points of BC and of the perpendicular from A on BC , makes with BC the angle $\cot^{-1}(\cot B - \cot C)$. 8
4. The cosine of the angle at which the circumscribed circle intersects the escribed circle opposite A is

$$\frac{1 + \cos A - \cos B - \cos C}{2}$$
 8
5. Prove that

$$\frac{1}{\sin \theta} = \frac{1}{\theta} + \frac{1}{\pi - \theta} - \frac{1}{\pi + \theta} - \frac{1}{2\pi - \theta} + \frac{1}{2\pi + \theta} + \frac{1}{3\pi - \theta} - \dots \text{ to } \infty$$
 9
6. Given two sides of a triangle and the included angle, to find a series for the logarithm of the third side. 9

SESSIONAL PAPER No. 25b

SPHERICAL TRIGONOMETRY.

(Time, 3 hours.)

	Marks.
1. Show that in two polar triangles, each angle of the one is the supplement of the side opposite to it in the other.	6
2. If A be one of the base angles of an isosceles spherical triangle whose vertical angle is 90° and a the opposite side, prove that $\cos a = \cot A$; and determine the limits within which it is necessary that A must lie.	6
3. Give Delambre's or Gauss' analogies and derive them.	10
4. Show that the number of spherical degrees (of surface) of a spherical triangle is equal to the number of angular degrees in its spherical excess.	10
5. Given two sides, and their included angle, find the other parts.	10
6. In the last problem, find the effect upon the third side of an error in one of the given sides or in the given angle.	8

ANALYTICAL GEOMETRY.

(Time, 3 hours.)

	Marks.
1. The locus of the centre of an equilateral triangle inscribed in a given ellipse is the ellipse $\frac{x^2}{a^2}(a^2 + 3b^2)^2 + \frac{y^2}{b^2}(3a^2 + b^2)^2 = (a^2 - b^2)^2$.	10
2. (a.) Show that the equation of a tangent to the ellipse in terms of the eccentric angle is $A \sin \phi \cdot y + B \cos \phi \cdot x = AB$ (b.) In an ellipse whose axes are 12 and 8, what is the length of the diameter from the point whose eccentric angle is 60° ?	10
3. Produce the general differential formulæ for the value of radius of curvature, and the co-ordinates of the centre of curvature of any plane curve, in terms of the co-ordinates of the given curve.	12
4. (a.) Produce the equations of the normals to the conic sections. (b.) At what point in the ellipse whose axes are 12 and 8 must a normal be drawn to make an angle of 45° with the axis of x ?	10
5. A parallelogram circumscribes a given ellipse, and the ends of one of its diagonals lie on the given straight lines $p\frac{x}{a} + q\frac{y}{b} = \pm 1$: prove that the ends of the other diagonal lie on the conic $\frac{x^2}{a^2} + \frac{y^2}{b^2} - 1 = \left(q\frac{x}{a} - p\frac{y}{b} \right)^2$.	13
6. (a.) Rectify the ellipse. (b.) The rectangle of the perpendiculars from the foci upon the tangent of the ellipse is constant, and equal to the square of the semi-conjugate axis. (c.) The squares of ordinates to the transverse axis of an ellipse are to each other as the rectangles of the segments into which they respectively divide the axis.	10
7. Find the evolute of the ellipse.	10

THEORY OF LIMITS AND DIFFERENTIAL CALCULUS.

(Time, 3 hours.)

Marks.

1. Find the limit of $\frac{1^r + 2^r + 3^r + \dots + n^r}{n^{r+1}}$ when n is indefinitely increased, n being any positive number. 20
2. Tangents are drawn to a circular arc at its middle point and its extremities, and the three chords are drawn. Shew that in the limit, when the arc is indefinitely diminished, one of the triangles contained by two tangents and a chord is eight times either of the other two. 20
3. Prove that the area of an ellipse is to that of the circumscribing circle in the ratio of the minor to the major axis of the ellipse. 20
4. Prove that the volume of an oblate spheroid is two-thirds that of the circumscribing cylinder. 20
5. Differentiate the following

$$e^{-a^2x^2} \cos rx; \tan ax; \log (e^x + e^{-x});$$

$$\cos^{-1} \frac{e^{2n} - 1}{e^{2n} + 1}$$
 20
6. Expand in ascending powers of x (each to five terms):
 $\log (1 + e^x); (e^x + e^{-x})^n; \log (1 + \sin x).$ 20
7. In a spherical triangle ABC , the sides c and a are constant. If α and β be the values of the angles A and B when C is a right angle, find $A - \alpha$ in terms of $B - \beta$ when C is slightly different from a right angle. 20

PROJECTIONS AND GEOMETRY OF THE SPHEROID.

(Time, 3 hours.)

Marks.

1. Deduce the formulæ for the construction of Mercator's projection. 10
2. Find the equation of a great circle on Mercator's projection. 10
3. Describe the orthographic projection and find the equation of a great circle. 10
4. Given the declination and altitude of a star, and the latitude of the place, give a graphic construction for finding the azimuth. 15
5. Find the expression of the radius of curvature of a section of the spheroid by a plane containing the normal to the surface and making a given angle with the meridian. 15
6. How do you combine the measures of several arcs on the surface of the earth for finding the length of the polar axis and of the equatorial diameter? 15

SESSIONAL PAPER No. 25b

GEODETIC SURVEY.

(Time, 3 hours.)

	Marks.
1. Reduce a difference of latitude on the spheroid to the corresponding difference of latitude on the sphere.	20
2. Find the radius of a parallel of latitude.	15
3. Explain the system of rectangular linear spherical co-ordinates referred to the meridian and a perpendicular to it. Give formulæ for their calculation.	20
4. Explain the differences between the normal sections, the geodetic line and the curve of alignment between two points.	10
5. Given the latitudes of two points and the azimuth from one point to the other, find their distance, using the sphere the radius of which is equal to the normal.	20
6. Find the offsets from the perpendicular to the meridian to the parallel of latitude tangent thereto.	15

GEODETIC SURVEYING.

(Time, 3 hours.)

	Marks.
7. Describe the different forms of signals used in primary triangulations, also Steinheil's form of heliotrope. Explain how the latter is adjusted to reflect the sun's rays in the proper direction.	20
8. Give examples of different kinds of chains of triangles. Explain their advantages and disadvantages.	15
9. Give a description of one of the base line apparatus consisting of metal bars. Explain how it is used and what corrections are applied to the measurements.	20
10. Explain the methods of repetition and reiteration for the measurement of angles. Compare the two methods.	10
11. Find the correction to be applied to the angle of a triangle measured to a signal marked by a reflecting sphere upon which the sun is shining.	20
12. Find the area contained between two meridians and two parallels.	15

6-7 EDWARD VII., A. 1907

ASTRONOMY.

(Time, 3 hours.)

Marks.

. From the following Ephemeris of the moon

July	3	0 ^h	5 ^h	—	45 ^m	—	15 ^s ·68
		12	6	—	14	—	54·73
"	4	0	6	—	44	—	06·70
		12	7	—	12	—	44·68
"	5	0	7	—	40	—	43·77
		12	8	—	08	—	01·02
"	6	0	8	—	34	—	35·42
		12	9	—	00	—	27·74
"	7	0	9	—	25	—	40·20
		12	9	—	50	—	16·14

Find the moon's right ascension July 3rd 4^h.

17

2. Give formula for obtaining geocentric latitude from the geographical, and indicate method of derivation.

17

3. Give formulæ for effect of retraction on right ascension and declination, and derivation of formula for dip.

17

4. The latitude of a place has been determined by observation of two zenith distances of the sun and the time between them; and each observed distance was too great by the same quantity Δz : prove that the consequent error in the latitude is $\Delta z \cos(a + a') / \cos(a - a')$: where $2a, 2a'$ are the azimuths at the times of observation.

17

5. On Feb. 19, 1906, in lat. $45^\circ 25' N.$, long. $75^\circ 42' W.$, what is the standard time when α and β Orionis are in the same vertical plane?

$$\begin{array}{ll} \delta_\alpha = 7^\circ 23' N. & \alpha_\alpha = 5^h 50^m \\ \delta_\beta = 8^\circ 19' S. & \alpha_\beta = 5^h 10^m \end{array}$$

16

6. A chronometer whose rate is uniform is found at Greenwich to have an error of δ^1 hours when the time that it indicates is t_1 . It is then taken to a place A , and when it indicates t_2 it is found that the excess of the observed local time of the place A over t_2 is δ_2 hours. It is now again brought back to Greenwich, and the chronometer time and error are observed to be t_3 and δ_3 hours respectively. Prove that the longitude of A east of Greenwich is $15 (\delta_2 t_3 + \delta_3 t_1 + \delta_1 t_2 - t_2 \delta_3 - t_3 \delta_1 - t_1 \delta_2) / (t_3 - t_1)$ degrees.

16

SESSIONAL PAPER No. 25b

ASTRONOMY.

(Time, 3 hours.)

Marks.

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 7. Give formulæ for obtaining the latitude from observing the horizontal circle readings of two stars at elongation, and discuss the effect of a small error of reading of the sum of the azimuths upon the latitude; also show how the choice of zenith or polar star affects the accuracy of the deduced latitude. | 20 |
| 8. In latitude $38^{\circ} 59' N$, long. $5^h 05^m 57^s.5 W$, the sun was observed at the same altitude, a.m. and p.m., by a chronometer regulated to Greenwich mean time; the mean of the a.m. times was $1^h 08^m 26^s.6$, and of the p.m. times $8^h 45^m 41^s.7$. Find the chronometer correction at noon, having given $\delta = -5^{\circ} 46' 22''.5$, $\Delta'\delta = +58''.10$ and equation of time $+11^m 35^s.11$. | 20 |
| 9. In a determination of time by means of the astronomic transit, observing stars clamps east and west, give the various formulæ involved in the reduction of the observations, including thread intervals, ellipticity of pivots, level, rate, aberration, star factors, observation and normal equations, weight and probable error of individual observation and of time determination. | 20 |
| 10. Give the general formulæ for the determination of longitude by moon culmination. | 20 |
| 11. Give the formulæ for deducing the mean place of a star from a given epoch to another; and also the formulæ for reducing a star from mean to apparent place, explaining fully the meaning of the symbols used in the formulæ. | 20 |

LEAST SQUARES.

(Time, 3 hours.)

Marks.

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Define Mean Error, Probable Error, Average Error, and give the relation between their values in the case of directly observed quantities. | 15 |
| 2. In a base line measurement a standard rod is used n times. If the probable error of the length of the rod is a , what is the probable error of the whole length measured? If the probable error of the whole base derived from a number of separate measurements is b , what is the probable error of one placing of the rod? | 15 |
| 3. If $x = .0240 \pm .0001$
$y = .0617 \pm .0003$
Find the ratio of x to y and the probable error to this value. | 15 |
| 4. If a and b be two values derived from observation with probable errors e and f .
(a) When the same quantity is measured in both cases, find the most probable value and the probable error of this value.
(b) When the observations are taken at times t and t_1 , and the quantity measured varies uniformly with the time, find its most probable value, and the probable error of this value, at another time t_0 .
(c) When the same quantity is measured both times, but in such manner that by theory the two observations are subject to equal and opposite errors, find the most probable value and its probable error. | 30 |

6-7 EDWARD VII., A. 1907

5. Explain the formation and solution of the normal equations formed from observation equations involving a number of independent unknown quantities. 15
6. Give and explain two methods of solution of observation equations where the unknown quantities are connected by geometrical relations. 30
7. If in a triangulation, there are n observation points, and r of the lines joining them are observed over in both directions, s in one direction only, how many independent angle and side equations are there? Show how these equations are formed. 30

SYSTEM OF SURVEY.

Marks.

(Time, 3 hours.)

1. Show derivation of formulæ in the Manual for radius of curvature and normal to the meridian,

$$R = \frac{a(1-e^2)}{(1-e^2\sin^2\varphi)^{\frac{3}{2}}}$$

and

$$N = \frac{a}{(1-e^2\sin^2\varphi)^{\frac{1}{2}}};$$

also of $\log(N \sin 1'') = \frac{1}{3} \log(R \sin 1'') + \frac{2}{3} \left\{ (\log a + \log \sin 1'' + 2Mu) \right\}$

where M is the modulus of the common system of logarithms, and

$$u = \frac{a-b}{a+b}.$$

25

2. A block of 3,500,000 acres in British Columbia adjoins the 120th meridian. It is bounded by two meridians and by two parallels of latitude. Along the 120th meridian it extends northward from the 19th Base over 12 townships.

Supposing the Fourth System of Survey to extend over the above area, express the position of the western bounding meridian at its northern and southern limits in terms of the survey system.

25

3. On the G. T. P. survey a tangent is started with an azimuth of N. 50° W. from the post at the N.E. angle of Sec. 36, T. 31, R. II W. of the 2nd meridian, and is run for 65 miles. Describe the position accurately with reference to section, township, range, of its northwest end.

25

4. A point is due west a hundred miles from the post on the 3rd meridian, and on the 4th Base line. The general elevation of the country is 2,000 ft. above sea-level. What is the position of the point with reference to the survey system?

25

5. In an observation in the vertical of Polaris for time, show the evaluation of p in the formula $t = p (\tan \varphi - \tan \delta)$, and give formulæ for rigorous solution of hour angle.

25

6. (a.) How is the deflection angle $7' 06''.9$ on the 14th Base, accurately turned off when the instrument only reads $20''$?

(b.) What is the position of the North Pole with reference to the Third System of Survey?

(c.) If the 17th Base is run in the summer, mean temperature 87° F., over 23 ranges, and the 18th Base in the winter, mean temperature minus mark 23° F., also over 23 ranges, each without correction for temperature. What would be the anticipated jog on the 17th Correction Line, Ranges 23 and 24?

25

SESSIONAL PAPER No. 25b

THEORY AND USE OF INSTRUMENTS.

(Time, 3 hours.)

	Marks.
1. What are the causes of axial spherical aberration, coma, astigmatism, curvature of field and distortion, in an object glass? What is their effect and how do they vary with the aperture and focal length?	20
2. Find the angular value of one revolution of the micrometer screw of a zenith telescope.	20
3. How are the eccentricity and errors of a graduated circle ascertained?	20
4. Describe the adjustments of a dumpy level.	20
5. How is a chronometer adjusted for variations of temperature? From a set of observed rates, to deduce an empiric formula for temperature correction.	15
6. Describe the different methods for measuring the inequality of pivots of a transit instrument.	20
7. Explain how the tube of a thermometer is calibrated and how it is graduated.	15
8. Describe hygrometric observations with a wet bulb thermometer. Theory of the method.	20

MINERALOGY AND GEOLOGY.

(Time, 3 hours.)

	Marks.
1. Describe the occurrence of nickel in the Sudbury district, with what other metals is it associated, and how is the ore treated to produce matte?	7
2. Show by diagram the geological formation in a vertical section between North Bay and Toronto.	7
3. How are limestones of different geological epochs distinguished. How are selenite, calc-spar, quartz crystal distinguished?	7
4. Draw a rough map of the Dominion and show where the commercial mines are located, indicating the nature of the respective mines.	7
5. Define—strike, dip and syn—and anti-clinal, cleavage, unconformable, fault, dyke, stope, level, drift, bloom, matte.	7
6. Describe the occurrence of cobalt and silver near Lake Temagami. What evidence is there for the probable occurrence of diamonds in Canada?	7
7. Describe our various iron ores and method of reduction to iron and steel.	8

6-7 EDWARD VII., A. 1907

TRIGONOMETRICAL LEVELLING, &c.

(Time, 3 hours)

	Marks.
1. Explain the different methods of determining differences of level between two points, stating precautions necessary in the observations and the corrections which must be applied to secure the greatest possible accuracy. Compare the advantages of the different methods in different circumstances.	13
2. What effect will local deviations of the plumb line have upon differences of level as determined by any method? Is it possible that this cause should produce discrepant results from different methods?	13
3. Describe the pendulum observation for determining the acceleration of gravity. What corrections are applied for instrumental errors, and what for the locality of the place of observation?	13
4. How may the ellipticity of the earth and its mean density be found from pendulum observations?	11

TERRESTRIAL MAGNETISM

(Time, 3 hours.)

	Marks,
1. Define a magnetic pole of the earth. How does the earth differ in this respect from a bar magnet? How may poles of declination, inclination and intensity be distinguished from one another?	19
2. Describe the observation for magnetic force with the magnetometer and deduce the formulæ for reduction.	19
3. In the observation for dip show how various errors are eliminated by the reversals. What is gained by repeating the observations with another needle?	19
4. Show how to transform the numerical value of the force from one system of units to another. If the force is 13 in the foot, grain, and mean time second system, what will it be when the yard, grain, and sidereal second are the units of length, mass and time respectively?	18

SESSIONAL PAPER No. 25b

APPENDIX No. 44 TO THE REPORT OF THE SURVEYOR-GENERAL.

Descriptions of surveyed townships submitted by Dominion land surveyors during the year ending June 30, 1906.

The townships of which descriptions are given are tabulated below :—

Township.	Range.	Meridian.	Township.	Range.	Meridian.
21	3	East of Principal.	4	17	West of Second.
5	9	" "	18	17	" "
6	9	" "	20	17	" "
8	9	" "	26	17	" "
5	10	" "	49	17	" "
5	11	" "	50	17	" "
6	11	" "	3	18	" "
7	11	" "	4	18	" "
8	11	" "	5	19	" "
1	12	" "	6	19	" "
2	12	" "	7	19	" "
3	12	" "	8	19	" "
4	12	" "	5	20	" "
5	12	" "	6	20	" "
6	12	" "	7	20	" "
7	12	" "	8	20	" "
1	13	" "	5	21	" "
S. ½ 7	13	" "	6	21	" "
2	14	" "	7	21	" "
17	1	West of	8	21	" "
18	2	" "	45	21	" "
19	3	" "	5	22	" "
20	3	" "	6	22	" "
19	4	" "	7	22	" "
20	4	" "	8	22	" "
19	5	" "	45	22	" "
20	5	" "	5	23	" "
20	6	" "	6	23	" "
27	15	" "	7	23	" "
28	15	" "	8	23	" "
27	16	" "	5	24	" "
28	16	" "	6	24	" "
18	21	" "	7	24	" "
19	21	" "	8	24	" "
18	22	" "	45	24	" "
19	22	" "	4	25	" "
19	23	" "	6	25	" "
20	23	" "	7	25	" "
37	29	" "	8	25	" "
38	30	" "	10	25	" "
10	31	" "	6	26	" "
10	32	" "	7	26	" "
36	5	Second.	8	26	" "
36	7	" "	10	26	" "
25	8	" "	10	27	" "
26	8	" "	11	27	" "
33	8	" "	12	27	" "
25	9	" "	6	28	" "
34	9	" "	4	29	" "
37	9	" "	5	29	" "
37	10	" "	22	6	Third.
37	11	" "	22	7	" "
27	12	" "	48	8	" "
39	12	" "	48	9	" "
40	12	" "	27	12	" "
38	13	" "	28	12	" "
39	13	" "	12	13	" "
40	13	" "	27	13	" "
41	13	" "	28	13	" "
49	13	" "	27	18	" "
38	14	" "	28	18	" "
39	14	" "	29	18	" "
40	14	" "	31	18	" "
41	14	" "	32	18	" "
42	14	" "	33	18	" "
49	14	" "	34	18	" "
49	15	" "	27	19	" "
50	15	" "	28	19	" "
49	16	" "	32	19	" "
50	16	" "	33	19	" "
3	17	" "	34	19	" "

6-7 EDWARD VII., A. 1907

Descriptions of surveyed townships submitted during year ended June 30, 1905.—*Con.*

Township.	Range.	Meridian.	Township.	Range.	Meridian.
27	20	West of Th'rd.	34	9	West of Fourth.
28	20	" "	35	9	" "
32	26	" "	36	9	" "
3	29	" "	27	10	" "
4	29	" "	28	10	" "
3	30	" "	29	10	" "
4	30	" "	30	10	" "
27	1	Fourth.	31	10	" "
28	1	" "	32	10	" "
29	1	" "	33	10	" "
30	1	" "	34	10	" "
31	1	" "	35	10	" "
32	1	" "	36	10	" "
49	1	" "	42	10	" "
50	1	" "	27	11	" "
51	1	" "	28	11	" "
52	1	" "	29	11	" "
53	1	" "	30	11	" "
27	2	" "	31	11	" "
28	2	" "	32	11	" "
29	2	" "	33	11	" "
30	2	" "	34	11	" "
31	2	" "	35	11	" "
32	2	" "	61	11	" "
49	2	" "	62	11	" "
50	2	" "	63	11	" "
51	2	" "	64	11	" "
52	2	" "	27	12	" "
53	2	" "	28	12	" "
27	3	" "	29	12	" "
28	3	" "	30	12	" "
29	3	" "	31	12	" "
30	3	" "	32	12	" "
31	3	" "	33	12	" "
32	3	" "	34	12	" "
33	3	" "	35	12	" "
52	3	" "	58	12	" "
53	3	" "	59	12	" "
27	4	" "	60	12	" "
28	4	" "	61	12	" "
29	4	" "	62	12	" "
30	4	" "	63	12	" "
31	4	" "	64	12	" "
32	4	" "	12	13	" "
33	4	" "	27	13	" "
34	4	" "	28	13	" "
27	5	" "	29	13	" "
28	5	" "	30	13	" "
29	5	" "	31	13	" "
30	5	" "	32	13	" "
31	5	" "	33	13	" "
32	5	" "	34	13	" "
33	5	" "	35	13	" "
34	5	" "	59	13	" "
32	6	" "	60	13	" "
33	6	" "	61	13	" "
34	6	" "	62	13	" "
35	6	" "	60	14	" "
29	7	" "	61	14	" "
30	7	" "	62	14	" "
31	7	" "	62	14	" "
32	7	" "	63	14	" "
33	7	" "	64	14	" "
34	7	" "	61	15	" "
35	7	" "	62	15	" "
27	8	" "	63	15	" "
28	8	" "	64	15	" "
29	8	" "	60	16	" "
30	8	" "	61	16	" "
31	8	" "	62	16	" "
32	8	" "	63	16	" "
33	8	" "	64	16	" "
34	8	" "	60	17	" "
35	8	" "	60	18	" "
52	8	" "	56	20	" "
27	9	" "	32	21	" "
28	9	" "	33	21	" "
29	9	" "	34	21	" "
30	9	" "	35	21	" "
31	9	" "	32	22	" "
32	9	" "	33	22	" "
33	9	" "	34	22	" "

SESSIONAL PAPER No. 25b

Descriptions of surveyed townships submitted during year ended June 30, 1905.—*Con.*

Township.	Range.	Meridian.	Township.	Range.	Meridian.
58	22	West of Fourth.	76	8	West of Fifth.
59	22	" "	24	9	" "
66	22	" "	53	9	" "
32	23	" "	76	9	" "
58	23	" "	24	10	" "
59	23	" "	25	10	" "
59	27	" "	76	10	" "
60	27	" "	25	11	" "
35	28	" "	26	11	" "
37	28	" "	76	11	" "
38	28	" "	76	12	" "
13	29	" "	76	13	" "
13	1	Fifth.	76	14	" "
39	1	" "	76	15	" "
58	1	" "	76	16	" "
59	1	" "	76	17	" "
60	1	" "	76	18	" "
73	1	" "	76	19	" "
74	1	" "	76	20	" "
75	1	" "	76	21	" "
76	1	" "	76	22	" "
13	2	" "	76	23	" "
15	2	" "	76	24	" "
46	2	" "	76	25	" "
59	2	" "	19	15	Sixth.
76	2	" "	20	17	" "
6	3	" "	7	22	" "
7	3	" "	8	22	" "
53	3	" "	9	22	" "
59	3	" "	11	22	" "
76	3	" "	4	23	" "
44	4	" "	5	23	" "
48	4	" "	6	23	" "
49	4	" "	6	23	" "
50	4	" "	9	23	" "
76	4	" "	10	23	" "
35	5	" "	11	23	" "
42	5	" "	12	23	" "
43	5	" "	13	23	" "
44	5	" "	10	26	" "
76	5	" "	11	26	" "
34	6	" "	15	27	" "
42	6	" "	16	27	" "
43	6	" "	17	27	" "
44	6	" "	18	28	" "
54	6	" "	4	29	" "
76	6	" "	5	29	" "
26	7	" "	6	29	" "
76	7	" "	7	29	" "
24	8	" "	8	29	" "
53	8	" "	9	29	" "
55	8	" "	20	"	East of Coast Meridian.
56	8	" "	39	"	West " "
57	8	" "			

Townships east of the principal meridian.—Range 3.

Township 21.—The country is very wet, and wood, water and game are plentiful.
—*Geo. A. Grover, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 9.

Township 5.—The greater part of the soil in this township is unfit for farming purposes, being of a very sandy nature with about 10 inches of sandy loam and a sand or gravel subsoil, except in the spruce and tamarack swamps, where the soil is a black loam, but until cleared and drained unfit for cultivation. Nearly all the surface

6-7 EDWARD VII., A. 1907

is covered with timber. The western and northwestern part being mostly spruce and tamarack from four to ten inches in diameter; while the eastern and southeastern part is jackpine and brulé, the jackpine averaging about seven inches in diameter. There is no hay to be found in the township. The water, which is found wherever the spruce and tamarack is growing is of first-class quality. A few small creeks are to be found which contain good, pure water. The land is not liable to be flooded but in wet seasons the swamps are wet. Wherever the jackpine is to be found there is no water of any kind, except what can be obtained by digging. There are no water-powers. Fuel can be had in large quantities both in this and in the adjacent townships, consisting of tamarack, spruce, jackpine and poplar. There are no stone quarries, coal nor lignite veins. There is very little game to be found, but moose, deer and bears are to be found, in the township to the north. The township is well travelled with good trails leading to Marchand, Ste. Anne and other points along the Canadian Northern railway, which passes through the western part of the township. The station of Bedford is situated on section 9, from where a large quantity of wood is shipped.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 9.

Township 6.—The soil of this township is nearly all first-class for farming purposes, being a black or sandy loam with clay subsoil, with the exception of parts of sections 1 and 12 which are for the greater part sandy ridges. The southern part of this township has nearly all been burnt over, but the timber is still standing and underbrush has grown up. The timber averages about six inches in diameter and is equally distributed over the township. The timber is mostly spruce and tamarack with some cedar. There are very few hay sloughs to be found, but by having some clearing done large quantities of hay could be had. All the water is of first-class quality. A few small creeks are to be found and excellent water can be had by digging in almost any part of the township. There are no water-powers, stone quarries, lignite veins nor minerals of any kind to be found. All through this district game is plentiful, consisting of moose, deer, black bears, wolves and foxes. Trails run through the township going to Woodridge, Bedford and Ste. Anne, towns on the Canadian Northern railway.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 9.

Township 8.—The greater part of the soil in this township is suitable for farming purposes, being a black or sandy soil with a clay subsoil. The greater part of the township is also covered with bush, but of such a nature that it will not be hard to clear especially in the southwest quarter of the township. The remaining part of the township is mostly covered with heavy bush, consisting principally of spruce, tamarack and jackpine from five to twelve inches in diameter. The jackpine is to be found in the southeast of the township and the spruce and tamarack in the north half. There is very little hay to be found except on sections 17, 18, 19 and 20, but it is very plentiful in the township to the west. Water is very plentiful and of first-class quality in the creeks and swamps. There are no water-powers and the land is not liable to be flooded. Fuel is very plentiful all through this section of the country, such as jackpine, spruce, tamarack and poplar. There are no stone quarries, coal nor lignite veins nor minerals of any kind to be found. Game consisting of moose, deer and black bears is very plentiful. The Dawson trail passes through the middle of the township from east to west, going to Ste. Anne, a village of about five hundred inhabitants, which is about twenty miles east on the main line of the Canadian Northern railway. Richer post office is situated about five miles west of this township, where there is also a school.—*John Molloy, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 10.

Township 5.—The land in this township is almost useless for farming purposes, the soil being a sandy loam from one to three inches in depth with a sand or gravel subsoil. The surface is mostly rolling or undulating, and the greater part is covered with bush, which consists principally of jackpine from two to six inches in diameter, with jackpine, poplar and willow scrub. Some spruce, tamarack and cedar is to be found in the northeastern part of the township. There is very little hay to be found in the township only a few small sloughs. The water is fresh in all the sloughs, swamps and small creeks, and good water can be had by digging from sixteen to twenty feet. There are no water-powers, stone quarries, coal nor lignite veins to be found. The climate is the general Manitoba climate with no summer frosts. Wood for fuel, consisting of jackpine, tamarack and spruce can be had in large quantities, both in this township and all through the surrounding district. Moose, deer and bear are very plentiful throughout the district. Trails going to Woodridge, a station on the Canadian Northern railway, seven miles to the south, pass through the western part of the township.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 11.

Township 5.—The greater part of the land in this township is not desirable for farming purposes at present, as it is covered mostly with heavy bush, and in many places tamarack and spruce swamps with considerable muskeg in the northeastern portion partly covered with bluffs of tamarack about three inches in diameter. A great deal of this part is almost impassable, except where the tamarack bluffs are, on account of it being a floating bog. The soil, however, is mostly a black loam. There are a few good quarter-sections on the southwestern part of the township which are mostly covered with poplar and thick willow and poplar scrub. Nearly all the land is level. The tamarack and spruce vary in size from three to fifteen inches in diameter and are to be found principally in the northwest and southeast quarters of the township. The east half of section 16 and the southern part of sections 2 and 3 are about the only places where hay can be obtained. The water which can be had in almost any part of the township is of first-class quality, and can be had in large quantities. The land is not liable to be flooded, but in rainy weather the swamps are mostly covered with water. A number of small creeks are to be found in the township and one somewhat larger than the rest passes through the southwestern part. The water in all the creeks is first-class. There are no water-powers, stone quarries, coal nor lignite veins to be found in the township. Wood for fuel can be had in large quantities, and in all the townships adjacent, consisting of jackpine, poplar, spruce and tamarack. Moose, deer, caribou and black bears are very plentiful all through this district. A trail leaving the township in section 3 goes to Woodridge, a station on the Canadian Northern railway, where there are stores, schools, a post office and a church.—*John Molloy, D.L.S., 1905.*

TOWNSHIP EAST OF THE PRINCIPAL MERIDIAN.

Range 11.

Township 6.—Only the northern boundary of this township has been surveyed. The easterly five miles of this boundary is located on rolling sandy land about half to two-thirds of which is timbered with jackpine from two to eight inches in diameter. The northerly boundary of section 31 is spruce and tamarack swamp in which the timber varies from spruce scrub two inches up to six or eight inches in diameter.

6-7 EDWARD VII., A. 1907

There is a portable saw-mill near the south boundary of section 32.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 11.

Township 7.—The surface of the township is level to rolling. The Dawson road crosses it in a southeasterly direction and a trail known as the Mennonite road runs southerly from the Dawson road and crosses the southwestern portion of the township. The Dawson road is located on a sandy ridge from a quarter to a half mile in width and another sandy ridge embracing rather more than the southerly halves of sections 2 to 6. With these exceptions the balance is nearly all spruce and tamarack swamps. Whitemouth river enters the township at the southeast corner of section 13 and flows out of the township across the east boundary of section 36. This river has an average width of about one chain, and a fairly rapid current in places, but was so firmly frozen over at the time of survey that it is difficult to give any estimate of its volume. The banks are twelve to forty feet in height and water-powers could be secured by damming but the flow of the river is so small at certain seasons of the year that they would be of very little practical value. There is a little soil of fair quality along Whitemouth river timbered with poplar, birch and spruce, but most of the soil on the dry land is very light and sandy while the swamps are moss and peat, of no value for agriculture unless drained.

About three-quarters of the township is timbered with spruce and tamarack with jackpine on the ridges. Very few trees are over eight inches in diameter. No hay land was seen. The water is of good quality and abundant. No stone quarries were seen but part of the land along the Dawson road, near Whitemouth river, is thickly strewn with large granite boulders. No minerals occur. Moose and spruce partridge are fairly numerous. The township is of very little value except for its fuel timber.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 11.

Township 8.—Most of the south half of this township consists of sandy ridges with scattered clumps of jackpine and poplar; and the greater part of the north half is spruce and tamarack swamp. The soil on the ridges is very light and sandy and of little or no value for agricultural purposes, while the soil of the swampy portion is chiefly moss and peat, too wet for cultivation unless drained. Nearly all the timber is under eight inches in diameter and of very little value except for fuel, of which there is an abundant supply. No hay was seen. The water is good and very easily obtained. No water-powers occur. Fuel is abundant. No stone quarries nor minerals occur. Moose and spruce partridge are fairly plentiful. The township is of very little value except for its fuel timber.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 1.—The eastern part of this township is unfit for farming purposes, the soil being of a very sandy nature. In the central part where spruce and tamarack swamps prevail, the soil is black loam and will produce all kinds of farm produce, when the land is cleared and cultivated. The surface is principally covered with timber, the eastern part with jackpine and the centre with tamarack and spruce. There is very little scrub. In the eastern part the jackpine is from three to six inches in diameter and in the central part the spruce and tamarack varies from four to eight

SESSIONAL PAPER No. 25b

inches in diameter. There is very little hay to be found in this township. The water is fresh; permanent water can be had by digging from twelve to fifteen feet. Only one small stream was met with. It crosses the meridian between sections 21 and 22. The land is not liable to be flooded. There are no water-powers. The climate is the general Manitoba climate. No frosts occur. Fuel can be had in the district, consisting of jackpine, spruce and tamarack. No coal nor lignite veins, stone quarries nor minerals were found. Moose, black bears, jumping deer and prairie chickens are very plentiful. The Canadian Northern railway passes through the township to the north. Vassar station is situated on section 6, township 2, range 13, where there is a post office and store. The Sprague trail, running from Winnipeg to Sprague, and the Vassar and Pine Valley trail, pass through the township.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 2.—The land in this township is nearly all third-class, being mostly sandy soil with a sandy or gravel subsoil and not very suitable for farming purposes. The great part of this township is covered with bush and scrub, except on the open sand ridges. In the southwestern part there is some spruce and tamarack swamps. The timber varies in size from three to twelve inches in diameter. There is very little hay to be found except in a few small sloughs. The water is all fresh and of first-class quality and can be had in large quantities all through the township, except in the sand ridges. A few small creeks are to be found which have good water. The land is not liable to be flooded. There are no water-powers to be found. Fuel can be had in large quantities all through the township and in the adjoining township, consisting principally of spruce, tamarack and jackpine. There are no stone quarries, coal nor lignite veins nor minerals of any kind to be found. The game consists principally of moose, deer and black bears. Trails pass through the township leading to Badger and Vassar stations, on the Canadian Northern railway, where there are a few small stores and post offices.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 3.—The soil in this township is entirely third-class, being nearly all sandy, with sand or gravel subsoil and would not be suitable for grain growing purposes. It is mostly covered with timber, consisting of jackpine, spruce, tamarack and scrub. The spruce and tamarack are to be found in the southeastern part of the township. The timber varies in size from four to twelve inches in diameter. There is very little hay to be found, except in a few small hay sloughs. The water is of first-class quality and can be had by digging in almost any part of the township. The land is not liable to be flooded. There are no water-powers to be found. Fuel in large quantities, consisting of spruce, tamarack and jackpine, can be found in all parts of the township and all through this district. There are no stone quarries, coal nor lignite veins or other minerals to be found. The game consists principally of moose, deer and black bears. Trails pass through the township leading to Badger, a station on the Canadian Northern railway, where there are a few small stores and a post office.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 4.—The soil in this township is mostly second or third-class, and the greater part of it will be suitable for farming or grazing when cleared and drained.

6-7 EDWARD VII., A. 1907

The soil is a sandy or black loam with a clay subsoil. The greater part of the township is covered with heavy brush, consisting of spruce, tamarack, poplar, jackpine and cedar from four to fifteen inches in diameter, all of which are equally distributed over the different sections, except in places in the western part of the township where there is second growth poplar and willow scrub to be found. There is very little open prairie to be found. Hay is not very plentiful, but there are a number of small sloughs in the western part where a considerable amount could be had by doing a little clearing. Good water is plentiful all through the township, in small creeks, sloughs and swamps. The land is not liable to be flooded at any time. There are no water-powers. Fuel is very plentiful and can be had all through this section of the country, consisting of spruce, tamarack, poplar, jackpine and cedar. There are no stone quarries, coal nor lignite veins nor minerals of any kind to be found. Game consisting of moose, deer and black bears is very plentiful. The trail from Woodridge to Whitemouth lake passes through the middle of the township from east to west.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 5.—The soil in this township is nearly all fourth-class, and almost useless for farming purposes on account of there being so many almost impassable muskegs and swamps, especially in the northwest quarter of the township, all along the southern two rows of sections. The eastern half of the township is mostly covered with bush, principally spruce and tamarack, from four to eighteen inches in diameter. In the northwest quarter of the township there is a great deal of open muskeg and floating bogs, partially covered with small bluffs of spruce and tamarack. There is scarcely any hay to be found in the township. Water can be had everywhere in the swamps, muskegs and sloughs, all of which is of first-class quality. There are no creeks. Fuel is very plentiful in any part of the township as well as all through this district. There are no stone quarries, minerals, coal nor lignite veins to be found. Moose, deer and black bears are very plentiful all through this section of the country. There are no trails going into this township, but a few miles to the south is a good trail going to Whitemouth lake and Woodridge.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 6.—Only the north boundary of this township was surveyed and with the exception of about half a mile at the crossing of Whitemouth river is spruce and tamarack swamp in which very little timber is over six inches in diameter.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 7.—The surface is level or gently rolling. The Dawson road crosses the township from east to west near the centre and is located on a broken sandy ridge varying from ten inches to one mile in width. The soil on this ridge is very light sand, and it is partially timbered with jackpine of an average of six inches in diameter, and a few acres of brule, while nearly all the balance is spruce and tamarack swamp with moss and peat soil. Whitemouth river crosses the southwest and northwest corners of the township having a width of about one chain. The depth and rate of current are difficult to give as the river was thickly frozen. The soil on the ridges is very light and sandy and in the lower portions consists of moss and peat too wet for cultivation unless drained. The greater portion of the surface is timbered with

SESSIONAL PAPER No. 25b

jackpine and with some poplar on the ridges and spruce and tamarack in the swamps. Only a very small proportion of the timber is over six to eight inches in diameter. No hay was seen. Water is very easily obtained and of good quality. Water-power might be developed on Whitemouth river but at certain seasons of the year the flow is so small as to render it of little or no value. Fuel is very abundant. No stone quarries nor minerals occur. Moose and spruce partridge are fairly plentiful.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 13.

Township 1.—The soil in the southwest part of this township is very sandy and unfit for farming purposes. The surface is generally covered with jackpine from three to six inches in diameter, with the exception of section 17, on which there is considerable poplar, spruce and tamarack. There is no hay land in the southwest part of this township. The water is fresh; permanent water can be had by digging from twelve to fifteen feet. The land is not liable to be flooded. There are no water-falls. The climate is the general Manitoba climate. No summer frosts occur. There is plenty of jackpine for fuel. No coal nor lignite veins, stone quarries nor minerals occur. Moose, black bears, jumping deer and prairie chickens are very plentiful. The Canadian Northern railway passes through the northern part of this township. The station of Vassar is situated on section 6, in the township to the north, where there is a store and post office. Trails from the south and from Pine Valley settlement to the west pass through this township to Vassar.—*John Molloy, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 13.

Township 7 (south half).—There is a jackpine ridge about half a mile in width crossing the south boundary on sections 1 and 2. This ridge is thickly timbered with jackpine, six to eight inches in diameter. The Dawson road crosses the township a little south of the centre on a broken narrow ridge, timbered with small jackpine and scrub. There are long areas of open swamp and muskeg, principally in the southeast quarter of the township, and the balance is timbered with black spruce and tamarack, only a small proportion being over six inches in diameter. The soil on the ridges is very light sand while the balance is wet and swampy. No hay was seen. The water is good and abundant. No water-powers occur. Fuel is abundant. No stone quarries nor minerals were found. Moose and spruce partridge are fairly plentiful.—*W. A. Ducker, D.L.S., 1905.*

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 14.

Township 2.—The greater part of this township consists of sandy loam with clay subsoil. When the land is cleared and cultivated it will be suited for farming purposes. In the swamps the soil is a black loam. All of the township is covered with bush and scrub, consisting principally of poplar, spruce, tamarack, cedar and thick willow scrub. The cedar, tamarack and spruce are principally on sections 6, 7, 8, 17, 18, 23 and 24, being from five to ten inches in diameter. Sections 1, 2 and 3 are tamarack swamps, the average diameter of the tamarack being about three inches. The northwestern part of the township is mostly tamarack swamps and some open muskeg. The remaining part of the township consists principally of undulating land covered with poplar and underbrush. There is very little hay land to be found in this township. The water is all of first-class quality and plentiful. Mud creek, a stream about

6-7 EDWARD VII., A. 1907

twenty feet wide and ten feet deep, passes through the southwestern corner of the township. The land is not liable to be flooded, but when the rains are heavy, the greater portion of the township is wet. There are no water-powers. The climate is temperate and no summer frosts occur. Fuel can be had in large quantities in this and in the adjoining townships, consisting principally of spruce, tamarack and poplar. There are no stone quarries, coal nor lignite veins to be found. Moose, deer and black bears are very plentiful all through this district. Trails, from the township to the south, lead up to the southern part of this township. The Canadian Northern railway passes through the centre of the township to the south, where Sprague village is situated.—*John Molloy, D.L.S. 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 1.

Township 17.—Access to this township is best by road from Teulon or Stonewall. However, a road runs around the north end of Shoal lake connecting these with a road to Oak Point. The soil is generally a good clay loam with a gravel subsoil in most places. Considerable tracts have been cleared and otherwise prepared for growing grain, especially in the northern row of sections and in section 22, with every prospect of a successful result. As cattle raising is already extensively followed, it would seem that mixed farming would be the most suitable for this township. The township is very slightly rolling and is generally made up of scrub land and hay swamps. Some poplar woods were noticed but the timber is of small size and, generally, is of no great importance. Hay swamps are plentiful in most of the townships and produce large quantities of excellent hay. Surface or swamp water is often found and is mostly of fairly good quality. Good water, however, can easily be got by digging wells. There are no streams nor water-powers. The climate, is of course, similar to that of central Manitoba. Wood is the only fuel and it will be scarce in a few years. No stone quarries nor minerals of value were noticed. A few deer and tracks of moose were seen, but generally speaking game is becoming scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 2.

Township 18.—Access to this township is easy by way of Teulon on the Canadian Pacific railway, or by way of Oak Point on the Canadian Northern railway. The soil is of fair quality, but being only a few inches in depth with a subsoil of gravel, the township would not appear to be a desirable one for raising grain. However, a number of settlers have incurred the expense of removing the stones from their land, and the result in crops of grain is said to be satisfactory. Along and near Shoal lake, however, the land is better suited for cattle raising. Hay is found in large quantities in all sections lying near Shoal lake and occasionally in other parts of the township. Running or surface water is scarce, but good water is easily got by digging wells. Timber of any value is scarce and was noticed only on sections 13, 14, 33 and 34. It is composed of poplar and some oak of fair size. In all other sections the land is mostly covered with scrub. There are no water-powers, and no stone quarries nor minerals of value were noticed. Game is generally scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 3.

Township 19.—This township can be easily reached by existing roads from Oak Point. The soil is of fair quality, but as it is of no great depth, and is stony with mostly a gravel subsoil, it can generally be only rated as second-class. Grain can, no

SESSIONAL PAPER No. 25b

doubt, be grown, but everything seems to show that cattle raising and dairy farming would be the most suitable occupation in the township. The surface is very slightly undulating and is mostly scrub land and hay swamps with some scattered tracts of scrubby prairie. Timber is sometimes seen but is generally of small size and of value only to settlers for fuel and building purposes. Hay swamps can be found all over the township producing large quantities of excellent hay. Surface water on the lines surveyed was not plentiful last season and generally it was not good, while the water in wells was not reliable. However, some ponds and lakes are always reliable and therefore plenty of water can always be found for stock within reasonable distance. There are no streams and therefore no water-powers. The climate is similar to that of the central parts of Manitoba, and therefore is suitable for grain raising. The only fuel is wood and it is not found in any great quantities. No stone quarries nor valuable minerals were found. Game of all kinds, except ducks, is scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 3.

Township 20.—Access to this township is easy by existing trails or roads from Oak Point. The soil is of good quality but is, generally, only a few inches in depth and has, mostly, a gravel subsoil. It is also stony and as the removal of these stones would be expensive the township, at present, is better suited for cattle raising and dairy farming than for any other purpose. The land is very nearly level and is composed of scrub land, hay meadows, marshes or ponds and poplar woods, the scrub land being the greatest in area, and the others in their relative proportion as written. The timber is mostly on the northerly row of sections and large ponds or small lakes occupy most of the southwesterly corner of the township. Elsewhere is found scrub and hay meadows generally. Hay is plentiful and is distributed fairly over the township. The surface water, as found in marshes, &c., is mostly fresh and the supply permanent and sufficient. There are no streams and no water-powers. The climate is suitable for any kind of farming as it is carried on in Manitoba. Wood is the only fuel in this locality but is not plentiful, except on the northerly row of sections. No quarries of stone nor minerals of any value were noticed. Some deer were seen, but generally, game of all kinds is getting scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 4.

Township 19.—This township can be best reached by wagon road from Oak Point. The land is mostly stony and the soil is not of much depth, with, generally, a gravel subsoil. Grain, however, can be grown in many places, but at present the settlers are chiefly engaged in cattle raising and dairy farming. I think this township would be suitable for mixed farming. The land, in the part surveyed, is nearly level and is composed of prairie, scrub land and hay meadows. The prairie land appears to cover about the southwest half of the township and the scrub the northeast half, while the hay of the meadows is found in all parts. There is no timber of any commercial value. Hay is generally fairly abundant, and appears to be about evenly distributed. Water when found was fairly good. The settlers, however, now depend, mainly, on wells for their supply. As there are no streams, there can be no water-powers. The climate is suitable for any kind of farming now carried on in Manitoba. Fuel will soon be scarce in this locality. No stone quarries nor minerals of value were noticed. Game is becoming scarce; a few ducks, only, were seen.—*Edgar Bray, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 4.

Township 20.—This township can be reached by existing roads from Oak Point station on the Canadian Northern railway. The soil is of good quality but is generally shallow and stony, with a gravel subsoil. In its present condition the land is better suited for cattle raising and dairy farms, than for any other purpose. The surface is generally nearly level and is made up of scrub land, hay land, marshes, some prairie and a few scattered bluffs of poplar mostly of poor quality. Hay land is found in almost every quarter section in this township, growing large quantities of hay of excellent quality. Water is plentiful and the supply generally permanent. The settlers, however, generally have wells in which the quality of the water is much better. There are no streams and therefore no water-powers. The climate is suitable for any kind of farming followed in Manitoba. Wood is the only fuel, and in quantity is only sufficient for the present wants of the settlers. No stone quarries nor valuable minerals were seen. Ducks in season were plentiful. Other game is becoming scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 5.

Township 19.—Access is easy to this township by existing roads from Oak Point. The soil is good, though not deep, and has generally a gravel subsoil, but if the land were cleared of stones good crops of grain might be grown. In its present state, however, it is better suited for cattle raising and dairy farming, an occupation already extensively followed in this and most other townships in this district. The land is nearly level and is composed of scrub land, prairie, hay meadows and marshes. The marshes are larger in area in the northerly sections of the township but generally the prairie, meadows and scrub are not confined to any particular locality, but are fairly distributed over the land. Timber, of any value, was not noticed. Surface, or swamp water, of fair quality is plentiful. The settlers, however, now depend on wells for their supply. There are no streams nor water-powers. The climate is the same as that of central Manitoba and is therefore suitable for any kind of farming now followed in that country. Fuel in this township is now becoming scarce. I saw no stone fit for quarries and no minerals of value. Ducks are fairly plentiful during their season but other game is very scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 5.

Township 20.—Access to this township is easy by roads from Oak Point. The soil is of good quality but as it is generally shallow and has a gravel subsoil it is not very suitable for grain growing. Cattle raising is followed, almost exclusively, by the settlers and for that purpose this township is well adapted though grain raising could, no doubt, be followed in some sections. The land is nearly level and is made up of meadows, marshes and scrub or woodland in about equal proportions. The woods are poplar of small size, generally, and are fairly distributed over the sections surveyed, but of value only to the settlers for building and fencing material. Water is plentiful and generally of good quality. Swan creek enters the township near the northwest corner of section 31 running in a southeasterly direction and soon empties into a large marsh. It reappears as a creek in sections 29, 28 and 21 and again in sections 15 and 16. The climate is, of course, similar to that of central Manitoba. Wood is the only fuel in this locality. No stone quarries nor minerals of value were noticed. Game of all kinds is scarce.—*Edgar Bray, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 6.

Township 20.—No difficulty is found in reaching any part of this township by roads now open to Oak Point. The soil is of good quality but as it is only a few inches in depth, is stony, and has a gravel subsoil it cannot be generally rated better than second-class, and for the same reasons this township is, at present, more suitable for raising cattle than for any other purpose. Potatoes and other vegetables are generally a good crop, and in the very few cases where the settler cleared the land of stones, good crops of grain were grown last season. The land is nearly level, and on the part surveyed is composed of woods, scrub land and hay swamps, the woods and scrub being about equal in proportion. The timber will average about seven inches in diameter and at present has no commercial value, other than supplying the settlers with building and fencing material. Sections 1, 2 and 3 may be classed as meadow land with scattered bluffs of woods and scrub and the land bordering on Lake Manitoba has the same general character. There are no streams nor water-powers. Fair water is usually found in the swamps and is generally easily got by digging wells. I noticed no summer frosts. Wood is the only fuel here, but it is sufficiently plentiful to last many years if it is taken care of. Fixed limestone was noticed in section 34 and in section 29. In the latter section some lime had been manufactured. No minerals of any value were found. Ducks are plentiful around Lake Manitoba but other game is very scarce.—*Edgar Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 15.

Township 27.—The township is reached by a fair trail from Ochre river which runs direct to the township. The soil is generally a black loam with clay or gravel subsoil, suitable when drained for mixed farming. The surface is generally timbered with small poplar and willow undergrowth, interspersed with hay and other marshes. The timber is poplar and but little of it exceeds eight inches in diameter. The larger timber is scattered, probably the best being in the eastern part of the township. Hay can be procured in many of the marshes but in a wet season few if any of the marshes can be entered. The water is fresh and in spring about half the surface is flooded to a depth of from six inches to two feet. The surface is very level and little above the level of Dauphin lake. There are no streams and no chance for water-power. The climate is that of Dauphin district, and summer frosts are not common. Wood is plentiful for fuel. There are no stone quarries. There are no economic minerals. Moose and elk are quite numerous in this district. A few jumping deer were also noticed.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 15.

Township 28.—This township is reached by a trail from Ochre river through township 27, range 15. The trail is very good in winter and summer but often impassable in spring time. The soil is generally a deep black loam suitable for grain growing. The surface is generally timbered with small poplar and willows with a number of sloughs especially in the northeast part. The largest poplar is about twelve inches in diameter but there is not much of this size. Most of the bush will run from four to six inches in diameter. Hay is cut in some of the sloughs now and in a dry season as during the past fall nearly all the sloughs could be mowed around the edges. The grass is coarse slough grass but great quantities of it could be obtained except in a wet season. Little water is found, except marsh water, which is not alkaline. The

6-7 EDWARD VII., A. 1907

supply in the deeper marshes is permanent but wells are easily dug and the water procured from these is much better than the marsh water. In the spring the township is probably one-half under water from six inches to six feet deep. The streams carrying off this water are slow but generally dry up in August or September. There are no rapids, falls or water-powers. Summer frosts are not frequent the climate being similar to that of Dauphin. Wood is the only fuel obtainable. There is no coal or lignite. There are no stone quarries. There are no minerals. Big game abounds, moose and elk being very plentiful. A few grouse were also seen. Drains will be a necessity for parts of this township as at the present time many of the marshes hold water the year through.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 16.

Township 27.—The soil is generally a black loam with clay subsoil suitable when cleared and drained for mixed farming. A trail from Ochre river to East Bay and thence to this township renders it easy of access. The surface is timbered with small poplar and willow generally averaging three inches in diameter. In many places marshes are found and some few poplar and spruce trees up to ten inches in diameter are scattered over the township. Hay can be procured in many of the marshes in a dry season. It is a coarse marsh grass. The water is fresh, but supply is doubtful during the whole season. There are no streams and no chances of water-power. In the spring much of the surface is flooded, especially the marshes and surrounding lands, but this usually dries up by fall. The climate is that of Dauphin district with few summer frosts. Wood is easily obtainable for fuel in the township. No coal or lignite veins were observed. There are no stone quarries nor minerals of any kind. Moose, elk and jumping deer were seen in this township.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 16.

Township 28.—The township is reached by trail from Ochre river or Dauphin through East Bay. The trail is bad in a wet season but very good in winter or fall. The soil is a good black loam suitable for grain growing but rather stony in places. The surface is generally covered with small poplar much of which is dead. There are numerous open sloughs in the northern part. Some of the timber is large enough for building but none fit for lumber. Plenty of coarse slough hay can be obtained in dry seasons in the sloughs. The water is generally fresh but the sloughs nearly all dry up in a dry season. There are no streams and no chances of water-power. The climate is that of Dauphin. Summer frosts are not frequent. Wood is the only fuel available and is plentiful in the township. There is no coal or lignite. There are no stone quarries but loose boulder stone is found in places throughout the township. There are no minerals. Moose, elk and jumping deer are plentiful. If this township is drained all of it will be suitable for agriculture. At some seasons as last spring the surface is about one-half under water, but this gradually dries up and this fall little water was obtainable in the township.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 21.

Township 18.—This township can be reached by the Rossburn branch of the Canadian Northern railway, which passes through it. The soil is a deep rich loam underlaid by a good clay subsoil and should be suitable for mixed farming. The surface of the township is rolling and much broken by lakes and sloughs, in the northern and western

SESSIONAL PAPER No. 25b

parts. Most of the sections have considerable scrub and some large timber as will hereinafter be described. Very little hay occurs in this township excepting on the river flats. Little Saskatchewan river flows southerly through sections 34, 9, 8, 5 and 6 and the Indian reserve in the central part of the township. The water of this river is fresh. Several small fresh water creeks flow out of some of the sections into this river. The water in Fishing and Dalmas lakes is slightly brackish, while in nearly all the other lakes the water is quite salty. The fuel used is poplar timber and can be obtained in sections 17, 18, 19, 20, 29, 30, 31, 32, 35 and 36, while more or less timber can be secured from almost any of the other sections. No water-powers occur. No stone quarries nor indications of minerals were noticed. The climate seems to vary, for while east of Little Saskatchewan river no summer frosts are reported; west of it frosts do occur. Partridge, wild duck and some moose were seen. Poplar timber measuring up to fourteen inches in diameter was found in different parts of sections 17, 18, 19, 20, 29, 30, 31, 32, 33, 35 and 36. Section number 1 is rolling land and scrubby, and is broken in the east half by a lake. Section 2 is broken in the north half by Lake Dalmas but the rest of the section is cultivated land. Section 3 is rolling land covered with scrub, the northwest quarter of which is partly cleared and cultivated. Section 4 is partly cleared and cultivated but is broken to a good extent by lakes and sloughs. Sections 5 and 6 are broken by Little Saskatchewan river. Good hay occurs in the river flats. The southwest quarter and the north half of section 6 and part of the northwest quarter of section 5 is cultivated land. The south half and the northwest quarter of section 7 is also cultivated land. The northeast quarter of sections 7 and 8 are more or less open. Section 8 is broken in the southeast quarter by Little Saskatchewan river as is also section 9 in the west half but the latter is mostly cleared and partly cultivated land. The south half of sections 10, 11, 12 and 13 are rolling and scrubby, while the northwest quarter of 12 is partly cleared and the south half of section 24 is mostly cleared and cultivated. The north half of section 24, east half of section 23 and parts of sections 25, 26, 35 and 36 are broken by Fishing lake but the west half of 26 is mostly cleared and cultivated. Large poplar timber occurs on sections 35 and 36 and section 34 is broken by Little Saskatchewan river. The west halves of sections 17, 20, 29 and sections 19, 30, 31, 32 and 33 are very much broken by salty sloughs and lakes. These sections are very scrubby and some large timber occurs on them. Section 18 is rolling and covered with scrub. There is a trail on both sides of Little Saskatchewan river leading northerly and southerly out of the Kesik-oo-we-ne-ew Indian reserve. Another trail leads through sections 23, 24 and 25 into the township, east. There is another trail winding through sections 19 and 30 to the Galician settlement in the northern part of the township west. The Canadian Northern railway leads through sections 13, 14, 9, 8, 5 and 6.—*Lennox T. Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 21.

Township 19.—This township is situated about fifteen miles northeast of the town of Shoal lake on the northwestern branch of the Canadian Pacific railway from which town it is easily accessible by good wagon roads. The new line of the Canadian Pacific railway passes within about eight miles of the southern boundary and will also afford a ready means of access. The soil is chiefly a rich black loam underlain by a clay subsoil and appears to be well adapted for general farming purposes. The township is divided in a northerly and southerly direction into two distinct parts by the valley of Little Saskatchewan river, which valley consists chiefly of fine open prairie land. That portion of the township west of the valley is of a very rolling and hilly character, whilst the eastern part of the township is very hilly and broken, some of the hills attaining elevations of one hundred and fifty feet above the river valley. The greater portion of the original forest on this township has been destroyed by fires and in

6-7 EDWARD VII., A. 1907

its place has sprung up a heavy second growth of young poplar. Fragments of the original forest still remain on sections 1, 2, 3, 4, 5, 6, 13, 14, 18, 21, 24, 25, 29, 33, 34 and 36. A small sawmill is located upon the north shore of the lake, in section 24, and to it a few logs are still hauled, chiefly from quite distant points. Nothing of any consequence suitable for milling purposes now remains upon the township. Comparatively little natural hay was observed, but the beautiful valley of Little Saskatchewan river affords an abundant supply of good prairie grass. This township possesses the most abundant supply of good fresh water of any in the locality, both in its numerous large lakes and in Little Saskatchewan river which traverses sections 36, 26, 23, 14, 11, 10, 3 and 2. Oak lake covers large portions of sections 4, 5, 8, 9 and 16, whilst another large lake occurs upon sections 12, 13 and 24. Numerous other small lakes, many of them of good size, occur upon other sections and all of them contain fine fresh water and most of them contain abundance of jackfish as well as some other varieties. Although Little Saskatchewan river traverses this township north to south it affords no very considerable water-power so that the sawmill at present being operated on section 24 is run by steam power. This township was surveyed between the 10th and 28th days of March and cold weather was experienced during the greater portion of this time. Good crops were harvested in this locality during the preceding summer and it would therefore appear that no severe summer frosts were experienced and that the climate was suitable for general farming purposes. There is sufficient standing timber remaining to afford fuel for the settlers for some years to come, although it is to be regretted that the great bulk of it has been destroyed by forest fires. No stone quarries and no minerals of economic value are known to exist upon this township. Several varieties of game are found, including moose, jumping deer, black bear, mink, duck, prairie chicken and ruffed grouse.—*J. W. Tyrrell, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 22.

Township 18.—This township can be reached by the Rossburn branch of the Canadian Northern railway, which passes through it. The soil of this township is good, consisting of a deep rich black loam, underlaid by a clay subsoil and would be adapted for any kind of farming, though the chief crop is oats. The surface is rolling and wooded in the northern and eastern parts, but towards the southwestern part it becomes prairie. Good hay is harvested around the sloughs throughout the township. Surface water is plentiful, however, it is mostly salty. A fresh water creek flows southerly through sections 31, 30, 19 and 18. The natural fall of the land being to the south, quite a number of the farms are to a certain extent flooded by the water which is drained from further north. The provincial government are, however, taking steps to relieve the flooded lands of this water. The fuel is mostly poplar wood, and can be secured from any of the sections in the northeastern part of the township. Poplar timber up to fourteen inches in diameter occurs in parts of this township as will be described hereafter. No water-power occur in this township. No stone quarries and no indications of minerals were found. The climate is naturally inclined to be cold, to which cause the growing of oats only can be attributed. Wild ducks muskrats and prairie chickens are plentiful. Several moose were seen. Sections 1, 13, 16, 17, 18, 19, 20, 29 and 30 are more or less open and mostly cultivated. Small poplars and scrub occur in bluffs on some of these sections. Sections 14, 15, 21, 22 and the south halves of 31, 32 and 33 and the west half of 28 are mostly scrubby, though small portions on nearly all of them are cleared and cultivated. The remaining parts and sections in the township are fairly well wooded with black and white poplars up to fourteen and sixteen inches in diameter. Some clearings have been made on most of these latter sections by the Galician settlers and are cultivated. A great number of lakes varying in size occur in the eastern two-thirds of the township. Some contain quite salty water, while in others it is more or less brackish. A number of trails exist

SESSIONAL PAPER No. 25b

in the northern part of the township, while in the western and southern parts the road allowances are mostly used. The Rossburn branch of the Canadian Northern railway passes through sections 1, 11, 10, 9, 8, 7, and 18.—*Lennox T. Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 22.

Township 19.—This township, situated in the Riding mountains of Manitoba, is about twelve miles northeast of the town of Shoal Lake, on the northwestern branch of the Canadian Pacific railway, from which town it is easily accessible by means of good wagon roads. The Canadian Northern railway is at the present time constructing a road which will pass within about six miles of this township and will afford the easiest means of access. The soil is chiefly a rich black loam underlain by a clay subsoil and appears to be well suited for general farming purposes. The surface is of a rolling character rather than very hilly and is almost entirely covered by a heavy forest of poplar and birch timber. The township is almost entirely covered by a forest of large poplars and in some places groves of birch with a few spruce in some of the northeastern sections. The township being so heavily timbered, contains comparatively little natural hay, although some large hay meadows were observed on sections 22 and 23. Other smaller hay marshes were noted on sections 1, 2, 3, 7, 15, 24, 32, 33, 34, 35 and 36. It is abundantly supplied with fresh water in the form of numerous large lakes, the chief of which covers large portions of sections, 9, 10, 11, 22, 23, 29, 30, 31, 32 and 34. Many smaller lakes occur in other parts of the township. No water-power exists in this township. The survey was performed between the 14th day of February and the 8th day of March and during most of this time cold zero weather was experienced. As to summer frosts I have no definite information other than that good crops were harvested in this locality during the previous summer from which it would appear that no serious summer frosts were experienced and that the climate is suitable for general farming. The heavy forest existing upon this township affords an abundant supply of fuel. At present large quantities of cordwood are being cut and hauled to Shoal Lake and other convenient markets. No stone quarries and no minerals of economic value are known to exist upon this township. Several varieties of game are found, including moose, jumping deer, black bear, mink, duck, prairie chicken and ruffed grouse.—*J. W. Tyrrell, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 23.

Township 19.—This township is situated in the Riding mountains of Manitoba, and is about twelve miles due north of the town of Shoal Lake on the northwestern branch of the Canadian Pacific railway from which place it is accessible by good wagon roads. The Canadian Northern railway is at present undergoing construction through the southwest corner of this township and will afford the easiest route of approach. The soil is chiefly a black loam from two inches to sixteen inches in depth with clay subsoil and appears to be well suited for the raising of general farm produce. The surface of this township is of a rolling rather than a hilly character and for the most part is covered by a heavy growth of poplar and willow scrub. Some prairie is found on sections 2, 3, 4, 6 and 7, while on some of the most northerly sections there is some poplar and birch timber affording a sufficient supply of fuel for present local use. Very little timber of any consequence remains, the original forest having been almost entirely destroyed by fires. Natural hay appears to be somewhat less abundant upon this township than upon some of the others in the vicinity, but natural hay marshes were noted upon sections 1, 2, 4, 5, 13, 14, 15, 28, 29, 33 and 36. Several large sized

6-7 EDWARD VII., A. 1907

lakes occur, the largest being upon sections 21, 22, 23, 24, 25, 26 and 28. No water-power of any consequence is known to occur in this township. The township was surveyed during the months of January and February, during which time the thermometer on one or two occasions registered as low as 40 degrees below zero. The average temperature was about 15 degrees below zero. From the fact that good crops were harvested in this locality during the previous summer it would appear that no serious summer frosts were experienced and that the climate is suitable for the raising of general farm produce. The limited quantity of poplar and birch timber remaining upon this township forms the local fuel supply, almost the whole of the forest having been destroyed by fire. No stone quarries and no minerals of economic value are known to occur in this township. Several varieties of game are found, including moose, jumping deer, black bear, mink, duck, prairie chicken and ruffed grouse.—*J. W. Tyrrell, D.L.S. 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 23.

Township 20.—This township is situated in the Riding mountains of Manitoba, and is about twenty miles due north of Shoal Lake station, on the northwestern branch of the Canadian Pacific railway, but only about six miles north of the newly constructed Canadian Northern railway, from both of which railways it is easily accessible by good wagon roads. It is about equally distant from the post offices of Oakburn and Rossburn at which latter place there are several general stores, a blacksmith's shop, &c. The soil is chiefly a rich black loam underlain by clay subsoil and appears to be well suited for general farming purposes. The surface of this township is considerably broken and hilly and almost entirely covered with timber and heavy scrub, the latter greatly predominating. Poplar, birch and spruce timber, varying from six inches to eighteen inches in diameter is found upon some sections, notably the following: 12, 13, 23, 24, 25, 27, 31, 32, 33, 35 and 36. The remainder of the township is covered by a heavy growth of poplar, willow and hazel scrub. This township possesses a very considerable amount of natural hay in the numerous marshes which may be found chiefly upon the following sections: 1, 3, 6, 7, 8, 9, 10, 11, 13, 14, 16, 17 and 30. It contains no lakes of large size but numerous small lakes and sloughs are scattered over its surface, from which one of the sources of the Little Saskatchewan is obtained. This stream, the headquarters of which lie in sections 28 and 34, flows through sections 27, 26, 23, 14, 11 and 12, and consists of fresh water of good quality. There is no water-power of any consequence; the dimensions of the stream passing through it being only from six to twelve feet in width and from six inches to two feet in depth. This township was surveyed between the first day of December and the 9th of January, during which time the weather was, of course, cold and wintry. As to summer frosts I have no definite information, but from the fact that good crops were harvested in this locality during the previous summer would infer that no serious summer frosts were experienced and that the climate is suitable for general farming purposes. The poplar forests occurring upon this township furnish an abundant supply of fuel for local use, provided it is protected from the ravages of forest fires which have already destroyed so much of the timber of this district. No stone quarries and no minerals of economic value are known to occur upon this township. Several varieties of game are found, moose, jumping deer, black bear, mink, duck, prairie chicken and ruffed grouse.—*J. W. Tyrrell, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 29.

Township 37.—This township is reached from Bowsman on the Canadian Northern railway by a wagon trail to section 13. This trail we have cut out and continued to

SESSIONAL PAPER No. 25b

the west side of the township joining a trail made by a surveyor when running the western outline. The soil is mostly clay loam. The surface is rolling and wooded with poplar, spruce and underscrub of willows, alder and hazel. The whole township is covered with woods, spruce and poplar from two inches to twenty-four inches in diameter, spruce predominating in the two northern tiers of sections and on sections 17, 18, 19, 20 and north halves of 7 and 8. A timber berth comprising this is now being surveyed. Some of the poplar in the balance of the township will be fit for sawing into lumber and large quantities of wood fit for fuel will still remain after all trees fit for lumber are cut. Hay is scarce, except probably in the southeast corner of the township. All the water is good. There are a large number of small creeks, which run dry in late summer. No land is liable to flooding to any extent. There are no water-powers. The climate is the same as at Portage plains. Wood is the only fuel. There are no stone quarries, but there are plenty of boulders in the beds of the creeks. No other minerals were noticed. Moose, bears, elk, rabbits and partridges were seen and plenty of wild fruits, consisting of currants, gooseberries, cranberries and bearberries.—*John Francis, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 30.

Township 38 (East boundaries, sections 25 and 36).—The line passes over a rolling country, each undulation being a step higher than the preceding one. The timber is much smaller than farther south and becomes on section 36 mostly jackpine and stunted spruce. The soil is poor, being gravelly knolls and mossy swamps.—*John Francis, D.L.S., 1905.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 31.

Township 10.—This township is reached by the Reston and Wolseley branch of the Canadian Pacific railway, which angles northwesterly through sections 24, 23, 22, 27, 28, 29, 32 and 31. The soil of this township is a sharp gritty loam underlaid by a sandy clay subsoil and is adapted for mixed farming. The surface of the land is open rolling prairie where it has not been broken up and cultivated. Loose stone occurs in some parts especially in the beds of some of the sloughs which are all dried up. Traces of alkali are found in the soil in the neighbourhood of the dried up sloughs. Fresh water can be secured by digging wells and is the only source of supply but it is not overly abundant. Good hay is harvested out of the sloughs which are mostly situated in the central and southern parts of the township. No hay meadows of any size were found. No timber exists in this township. No water-powers nor stone quarries, nor traces of minerals were found. Fuel can be secured from Moose mountain, which lies to the southwest about thirty-five miles. In former years and at present some is procured from the valley of Pipestone creek about fifteen miles east, although this source of supply is almost extinct. Coal no doubt will shortly be supplied from some of the stations along the railway. The only existing game are prairie chickens and some sand-hill cranes, both of which are scarce. An old cart trail formerly known as the Winnipeg trail crosses through sections 6, 5, 8, 9, 10, 11 and 12. Where it is not ploughed up it is in good condition. A trail also follows along the route of the railway. Several less travelled trails lead northerly and easterly out of this township to some of the towns on the main line of the Canadian Pacific railway. The climate is about average. No summer frosts were reported by the settlers.—*Lennox T. Bray, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 32.

Township 10.—This township can be reached by way of the Reston and Wolseley branch of the Canadian Pacific railway, which crosses through sections 36, 35, 34, 33, 32, and 31. The soil of this township is a good deep loam, underlaid by a sort of cemented clay and gravel. It is adapted for mixed farming. The surface is open rolling prairie where it has not been broken up and cultivated. Loose stones occur in the beds of some of the dried up sloughs in various parts of the township. Fresh water can be secured by digging wells and is the only source of supply. Good hay is harvested out of the sloughs which occur mostly in the central and southern parts of the township. No timber exists in this township and no water-powers, stone quarries nor traces of minerals were found. Wood can be secured for fuel from Moose mountain which lies to the southwest about thirty miles. Coal can be secured at Moosimin, but in a short time it no doubt will be supplied from some of the stations along the Reston and Wolseley branch of the Canadian Pacific railway. The only game seen were prairie chickens and sandhill cranes, the latter seeming fairly plentiful. The climate is about the average. No summer frosts were reported by the settlers. An old cart trail known as the Winnipeg trail crosses the southeast quarter of section 1. This trail is in good condition. A trail also follows along the route of the railway. Several smaller trails lead northerly out of this township to Moosimin and other towns on the main line of the Canadian Pacific railway. This and the township east of it are being rapidly settled by industrious farmers and though the land has but recently been broken up, yet good crops of both wheat and oats were harvested in some places.—*Lennox T. Bray, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 5.

Township 36.—The Etoimami river crosses this township nearly centrally from north to south. It has an average width of seventy-five feet and a depth of two feet with slow current. The bed of the river is for the most part stony and has numerous boulders along the margin. The bank of the west side varies from twenty to fifty feet high. There are some scattered bluffs of spruce on both sides of the river specially in section 9. Some of this is fair building timber. Along the west side of the river there is a belt of high, dry and open prairie about fifty chains in width very suitable for pasture and wintering horses and cattle, owing to the large amount of buffalo grass. This belt is knolly and hilly, the hills and knolls are from twenty to seventy-five feet above the bed of the river and very gravelly and stony. The northeastern and eastern portion of this township is interspersed by numerous ponds, marshes and muskegs, and is therefore not very suitable for immediate settlement. There is a fair supply of poplar bluffs suitable for fuel. The soil ranks first-class, varying from black clay loam to alluvial clay loam with clay subsoil. The western part, with the exception of the belt above mentioned can be ranked first-class and is well adapted for farming purposes. There is a good wagon road running north and south on the west side of the river and another following the east outline of this township going as far as Mr. Foldchum's sawmill.—*A. Bourgeault, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 7.

Township 36.—This township is generally rolling and very bushy, some of it being fair building timber. There are numerous sloughs, marshes and swamps containing good water, except the swamp in the southwest quarter of section 17 which is alkaline.

SESSIONAL PAPER No. 25b

There are some scattered bluffs of spruce of no value as timber being nearly all rotten. The southern part is thickly covered with windfalls. The soil ranks first-class, being a deep black loam with clay loam subsoil. The northeastern corner is crossed by Assiniboine river, which runs southeast in a deep valley, averaging ten chains in width. The bank on the south side is seventy-five feet high and the north side is one hundred and twenty feet above the bed of the river. The average width of the river where crossed by the line is seventy-five links, in some places the margins are very soft. The depth of the river varies from two feet to four feet. The water is splendid. There is a good and well-opened pack trail on the north side of the river.

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 8.

Township 25.—The western and northwestern parts are generally rolling, broken by numerous sloughs, swamps, hay marshes and lakes of good water. The surface is covered by thick willows, young poplars and windfalls still good for fuel, and a few scattered small bluffs of poplar good for building are found around the lakes. The soil is of first-class quality, being composed of black sandy loam and black loam with clay loam subsoil, but is not fit for immediate settlement. The second portion (the southern and eastern) is more or less open land and well adapted for any farming purposes. The soil is first-class, though a little more sandy. There is some fair building poplar timber, namely, in section 5 and 6 and in sections 35, 36, 26 and 23, and the north half of 25. The water is good everywhere. The township is well watered by creeks. Willow brook enters in section 34 and runs south and crosses the east boundary of section 34, the north of 26 and east of the same and from there runs straight east. It has generally a swift current and stony bottom; the banks average twenty-five feet high and some places twice that height. A large quantity of hay can be cut on the margins of the sloughs and in the hay marshes. A considerable number of settlers started farming with very good results. Some Galicians have settled and made some improvements on their homesteads. Ranching was prosperous some years ago but owing to the high water they were unable to procure hay so most of them quit. —A. Bourgeault, D.L.S., 1904.

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 8.

Township 26.—This township is accessible by good trails from either Yorkton or Theodore on the Manitoba and Northwestern branch of the Canadian Pacific railway. For several years the residents from towns and townships to the east have procured most of their fuel, fencing, timber, &c., from here. The soil is a rich black loam from three to eighteen inches in depth, with either a clayey or sandy subsoil. Nearly the entire surface has been covered with poplar from small trees to a diameter of fifteen or sixteen inches, but a fire four or five years ago must have destroyed the bulk of the green timber, as nearly all the large trees of any size are dead. A thick growth of scrub, mixed with peavine, is found everywhere covering the surface of the ground and hiding from view the numberless trunks of fallen trees, which render travelling very difficult. There are fringes of meadow around ponds and expansions of streams, where settlers already in the township find hay sufficient to provide for their stock during the coming winter. Fresh water is plentiful in ponds and muskegs. There are also three or four small streams which flow towards the southeast, but are so small that with two exceptions they are dry after a period of dry weather. Of the permanent streams, one flows east by south leaving the township in section 24 and the other flowing southeast enters the adjoining township to the south in section 35. There are no water-falls, nor streams large enough to be utilized for generating water-power. The

6-7 EDWARD VII., A. 1907

past season, as to climate, was very favourable. There were no summer frosts, and wheat, oats, barley and peas all matured from the first to the 10th of September. No indications of coal nor outcroppings of minerals of any description were observed. Dry wood, both fallen and standing, is found in abundance all over the township. Prairie chickens, ducks, prairie wolves, large grey wolves and foxes are quite plentiful. Other game seemed scarce. There are a good many settlers located in the township but few improvements have been made, owing to the difficulty of locating their claims prior to the survey. Improvements will not be made very rapidly as the work of clearing away the brush and timber will be considerable. When once cleared nearly all the land will be first-class.—*Thos Fawcett, D.T.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 8.

Township 33.—The general aspect of this township is rather low land, more or less covered with dense underbrush, dry willow and poplar brush, interspersed with many swamps, sloughs and marshes. It is, however, well adapted for farming purposes. The soil, except on tops of ridges, which are generally gravelly, ranks first-class, being a rich black and sandy loam with clay loam subsoil. The northeast part of this township is swampy. There is no timber worth mentioning, but a lot of windfalls which are good for fuel. A good supply of hay can be cut about the centre of this township. The Canadian Northern railway crosses obliquely through section 6. If a good fire were to run over this township it would make it a splendid one for farming purposes owing to the quality of the soil.—*A. Bourgeault, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 9.

Township 25.—The general aspect of the southern and western two tiers of sections is more or less open land with some brush and numerous hay marshes and sloughs with a large supply of hay. The soil is first-class, being composed of sand and black loam with a clay subsoil. At the time of survey three or four buildings were located in this township by Galician settlers. The portion above described is well adapted for all farming purposes. The remainder is rolling and hilly or lumpy with a growth of grey willow and young poplar, some good for fencing purposes. It is broken by numerous sloughs, swamps, ponds and lakes. Good water is found everywhere. The quantity of hay available is not in proportion to the sloughs and marshes. Some parts are covered with heavy windfalls, good for fuel. The land throughout is first-class, but there is very little available for immediate farming owing to the above-mentioned obstacles. There is a fair lake of good water which covers the greater part of section fourteen. In some places the banks are about twenty feet high.—*A. Bourgeault, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 9.

Township 34.—The southern two tiers of sections and the south half of section 18 of this township are pretty fair land for immediate settlement, though mostly covered with heavy growth of grey willow and poplar brush and scrub. Nevertheless a quantity of hay can be secured and good pasturage. The soil throughout the township is first-class, being composed of sandy loam alluvial soil and clay loam subsoil. All the remainder of this township is generally undulating and some places knolly and broken, interspersed by large grass swamps, marshes and ponds. There are, however, heavy poplar bluffs of good size which are well protected and isolated by swamps, from the

SESSIONAL PAPER No. 25b

fires which periodically run over this section. Any amount of hay can be secured from the northeast corner of this township and along the north boundary. There is a large lake which partly covers sections 27 and 28, called 'Pig lake,' from finding a pig on the west side. The water is all good. There is a creek which crosses the north boundary of section 31. This creek has high banks generally well wooded with poplar and high willow good for pickets. A few settlers are located on the southwest part and on section 18.—*A. Bourgeault, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 9.

Township 37.—The road to this township is by a trail from Prouse's ranch eastward across ranges 11 and 10, near the 10th base line. It is used by settlers in the townships south of the base. There is a good wagon trail from Wadena—a new town on the Canadian Northern railway—to Prouse's, also connection via the Nut lake trail with the railway siding at Kylemore. The soil is a clayey or sandy loam with a few inches of black vegetable mould on the surface. The best land adjoins the south boundary of the township, there being a good deal of muskeg and wet land across the central part. A few acres of good spruce timber is found at the southeast corner of section 6. Timber is cut here by settlers south of the base. There is also good spruce on islands in a lake covering parts of sections 29 and 30, also on islands in a lake in sections 25, and some dry fallen spruce in muskegs. In the sections along the north boundary some of the original poplar has escaped the fires and in these spots trees are found varying in size up to sixteen inches in diameter and very tall. The bulk of the timber has been destroyed by fires nine or ten years ago and the surface is covered with a scrubby second growth. There is very little meadow land but there will be plenty when the swamps are cleared of brush and logs. Water is good and is plentiful in ponds and muskegs. The drainage appears to be eastward towards Assiniboine river, this township being on the watershed. There are no creeks but some small streamlets where the water seems to flow eastward after heavy rains. The vegetation did not show any indication of injury from summer frosts during the earlier months. This whole township contains wood suitable for fuel and in patches plenty for other purposes, but no area sufficiently large or valuable to withdraw from settlement. No coal nor minerals of any description are visible. Game seems scarce there, being a few duck, partridge and rabbits. Bears and wolves are plentiful; there are also some deer and foxes.—*Thos. Fawcett, D.T.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 10.

Township 37.—This township is accessible by a trail which follows the base line very closely across range 11 from Mr. Peter Prouse's ranch. There is a good wagon road from there to Wadena on the Canadian Northern railway. The soil in this township is a black loam formed from vegetable mould, several inches in depth covering a clay or sandy subsoil, and is very fertile. The best land for cultivation is in the southerly part of the township. Good building logs of spruce can be got in sections 1, 2 and 10, but as the settlers from the townships south come here for their building logs it will only be a matter of a year or two until the best will have disappeared. The northerly part of the township is covered with small scrubby poplar, willow, balm of Gilead, &c. The country has been heavily timbered, but overrun by fire and the present growth does not seem to be more than seven or eight years old. There is some good meadow land in sections 5 and 7 but the proportion of meadow to other land is small. Water is good and is plentiful in ponds. The southwest corner of the township is crossed by Pipestone creek which enters the township in section 3 and leaves it in

6-7 EDWARD VII., A. 1907

section 7. A small stream which rises in the spruce in section 10 flows southwest and joins the Pipestone in section 5. This is excellent spring water. Climatic indications were favourable during the earlier summer months. There is an abundant supply of dry wood for fuel in all parts of the township as the bulk of the larger poplar has been firekilled and in places the second growth hides from view hundreds of fallen trees which make the woods almost impassable. No coal nor indications of minerals of economic value were observed. Duck and partridge are the principal feathered game, while bears, wolves, foxes and deer compose the large game. Rabbits are very numerous some seasons and seem to be increasing in number this year.—*Thos. Fawcett, D.T.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 11.

Township 37.—Wadena, a recently established town on the Canadian Northern railway, has become the base of supply for this locality. A more convenient point is a siding named Kylemore, seven miles east of Wadena, where the Canadian Northern railway crosses the old Nut lake trail. This station is the usual destination of settlers who bring through their stock and implements in carloads, as it leaves them within a day's journey of their destination. From there the trail is followed to Duck creek and thence by another trail to Mr. Peter Prouse's ranch. Except in periods of wet weather the road is in good condition. The surface soil in this township is nearly all of first-class quality, consisting of from two to eighteen inches of black loam of leaf or vegetable mould with a clayey or sandy subsoil, and will produce any crops desired, either grain or vegetables. The best land is that nearest the south boundary of the township. The surface is more or less undulating with a few fair-sized hills near the north boundary. There is little timber of value except for fuel, fencing and ordinary buildings. A few good spruce, from eight to sixteen inches in diameter, are found in sections 23 and 24 and pretty fair poplar in sections 21 and 22. The bulk of the large timber has been killed by fires during the dry seasons and the greater portion of it burned up. The surface, however, is covered with thick scrub or brushwood, part of which in time would grow into good timber if unmolested. There is some good meadow land in spots along Pipestone creek and a few meadows on the margins of sloughs, but no great quantity of hay. The peavine, which grows in many places makes excellent feed if cut at the right time. Water is abundant in ponds, lakelets and muskegs, also in Pipestone creek which enters this township in section 12 and leaves it in section 31 after following a fairly straight course west by north. The creek would average ten feet in width and thirty inches in depth in its normal condition. The current is brisk but there are no waterfalls nor facilities for forming any by constructing dams, without flooding good land. The land where cultivated is not subject to summer frosts. Dry wood for fuel is plentiful, but there are no indications of coal nor minerals of economic value. Duck, prairie chicken and partridge are the game birds found while tracks of bears, deer, wolves and foxes are quite common.—*Thos. Fawcett, D.T.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 12.

Township 27.—I reached this township by taking the trail leading southwesterly from Sheho. This trail is in fair condition and is largely used by the settlers from this township, in going back and forth to Sheho, which is apparently their most convenient railway station and market town. The soil in this township is mainly a rich black loam, from four to sixteen inches deep, with a clay subsoil, and is well adapted for the growth of the various grains and vegetables, usually grown in the district, but as the surface is considerably broken with ponds and marshes, a great portion of

SESSIONAL PAPER No. 25b

it is better adapted for grazing or mixed farming, than for grain growing. A great many of the homesteads are now occupied and more or less improved and no doubt, nearly all of them will be occupied at an early date. The surface is rolling land, the greater portion of which is prairie, dotted with small poplar bluffs and willow brush and scrub. Poplar timber, suitable for use by the settlers in building their houses and barns is found in small quantities scattered over the greater portion of the township, and considerable areas of good poplar timber, up to fourteen or fifteen inches in diameter are found in the northeast portion of it, in the vicinity of Horse lake and also in sections 5, 8, 17, 20, 29, 30 and 31. A heavy growth of hay is found along nearly all the marshes and large quantities of it are annually gathered and stacked up by the settlers and ranchers. There are practically no streams in the township, but large amounts of fresh water are found in the ponds and marshes. Good water can be readily obtained from wells dug a very moderate depth. No coal or lignite is known to exist in this township, and the only fuel is the timber already referred to. No stone quarries nor minerals of economic value were found. Large numbers of wild ducks breed in this township, also a considerable number of prairie chickens and ruffed grouse were seen. There are also a few badgers, red foxes and prairie wolves. —*Geo. Ross, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 12.

Township 39.—The quality of the land in this township is first and second-class, being twelve to eighteen inches of black loam on clay subsoil. The southerly part on both sides of Nut lake is flat with numerous sloughs. About twenty-five per cent of those lands are well adapted for agricultural purposes and fifty per cent more, when cleared will grow excellent hay and be good pasture lands. A considerable extent of hay of fair quality now grows on open flats around the sloughs. The timber is small poplar two to four inches in diameter, and willow scrub. There is an abundance of good fresh water. The stream crossing the north boundary of section 19 becomes enlarged as it approaches Nut lake. It is an outlet of considerable magnitude in the spring time, but the westerly part becomes dry in the fall of the year. The fuel, although small, sufficient dead timber of fair size can be obtained. The climate is beautifully bright with sunny days and frosty nights in October. No stone quarries nor minerals of any economic value were found in this township. Rabbits, partridge and duck were plentiful, with a few prairie chickens. Fish (pike species), were plentiful in Prairie Butte creek in the southeasterly portion of the township.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 12.

Township 40.—The soil in this township is generally a black loam four to eighteen inches deep on a clay subsoil. In a few places it is a sandy loam. About sixty per cent of the area is first and second-class land for agricultural purposes. Some excellent large poplar timber six to eighteen inches in diameter and some spruce of the same size are located on sections 34 and 35, otherwise throughout the township is timbered with poplar two to six inches in diameter or willows. A few small tamarack swamps occur. The timber is nowhere sufficient for timber berths but is valuable for fuel and building purposes. With the exception of a very few small openings the township is timbered throughout. No hay marshes of any extent were found. There is some excellent pasture land in the easterly part of the township where abundance of pea-vine is to be found. The Nut Lake Indian reserve cuts off a portion of the southwesterly part of the township. Red Deer river flows across the northwesterly part of the township. In the spring of the year it has an average width of one hundred and twenty feet with four to five feet of a depth and a current of about three miles

6-7 EDWARD VII., A. 1907

per hour. In the summer and fall of the year the bed is almost dry. On account of the variableness of the flow, the stream is not likely to be developed for water-power. There is abundance of fresh water throughout the township. During most of the survey the weather was very fine and the atmosphere clear and bright. There is fuel in abundance, both green and dry, and easily procured throughout the township. No stone quarries, coal nor lignite veins were found. Partridge, rabbits and ducks were plentiful; coyotes and foxes were occasionally seen and fish (pike species), from two to three pounds were easily obtained in the Red Deer river.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

Township 38 (North part).—The soil is first-class throughout the northern tier of sections, being a dark loam twelve to eighteen inches on a clay subsoil. The rating in the field books is of a lower classification on account of the extent of willow marshes and numerous sloughs. Fifty per cent of the area is first and second-class agricultural lands, while thirty per cent of the balance will furnish excellent hay and pasture lands. The surface is slightly rolling with considerable low lying lands. The timber is small scrub poplar and willow with occasional scattered clumps of poplar six to eight inches in diameter. Hay of fair quality grows on the flats and around the sloughs while pea-vine is to be found on some of the higher lands. Water in some locations was alkaline. There is no difficulty in obtaining a sufficient permanent supply of fresh water. Flat lands were dry at the time of survey but doubtless are flooded in the spring to a depth of twelve to eighteen inches. There is no water-power within the limits of this survey. The climate at time of survey in September was excellent, beautiful bright sunny days, with frost sufficient to form ice on sloughs at night. Sufficient green and dry wood for settlers can be procured throughout the area surveyed. Neither stone quarries, coal, lignite veins nor minerals of any economic value were found. The sloughs were dotted in every direction with a great variety of ducks. Woodcock were plentiful and pelicans were frequently seen in large flocks.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

Township 39.—The soil in this township is generally a rich black loam on a clay subsoil. At least thirty per cent of the township when cleared will be excellent agricultural lands, the remaining part, particularly the southwest portion has large sloughs with considerable extent of grass marsh bordering them, as well as hay of fair quality. Drainage of these flat lands will reclaim at least forty per cent more of area to agriculture suitable for hay and pasture lands. Some excellent large poplar six to twenty inches in diameter, suitable for building purposes grows on sections 19, 20, 29 and 31. Other parts of the township is timbered with poplar and willow from two to six inches in diameter. The swamps are timbered with stunted tamarack from six to ten inches in diameter. A few small scattering clumps of spruce occur in places, but the timber throughout is of no commercial value except for local building purposes and fuel. There is an abundant and permanent supply of good fresh water. No creeks of any size that might be utilized for water-powers were found. The climate is delightful and the atmosphere beautifully clear. A few frosty nights occurred in the latter part of August, but did not, however, appear to affect the foliage. There is an abundance of good dry poplar wood, killed by forest fires of former years to be found in locations throughout the township. No stone quarries, coal, lignite veins nor minerals of economic value were found. Ducks, woodcock and plover were very plentiful, and fresh moose tracks were occasionally seen as well as a few black bears.—*A. G. Cavana, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

Township 40.—This township is reached by taking the Canadian Northern railway to Crooked river, thence in a southwesterly direction over an Indian trail, connecting on the north side of Barrier river in township 40, range 12, with a cart trail between Melfort and Nut lake. Before reaching the former trail, Barrier river, a turbulent stream, about forty yards wide, and three or four feet deep is crossed, thence the trail is followed in a southwesterly direction to the northeast angle of the township. A considerable portion of the trail was almost in an impassable condition, the sloughs being numerous, the creeks very high and the flat lands generally flooded to a considerable depth. The soil throughout this township, except swamps and muskegs, is first and second-class, being black loam, clay loam, or a good sandy loam, varying in depth from four to eighteen inches, on clay subsoil. At least forty per cent of the area of the township, if cleared and drained, is well adapted for farming, a fair proportion of the remainder being suitable for grazing lands or for growing hay. The surface of the higher or rolling lands is timbered with poplar from two to six inches in diameter. The flat lands are covered with scrub poplar and willow, while the swamp lands are timbered with stunted tamarack from four to eight inches in diameter. Occasionally throughout the township small clumps of spruce or scattered trees from six to eight inches in diameter are met with, nowhere, however, worthy of special mention, but these together with the larger class of poplar throughout the township will be valuable to settlers for fuel and for building purposes. There is a fair supply of good dry poplar wood, of medium size and brulé is occasionally met with. No hay marshes of any extent are to be found in this township, though the sloughs are bordered with hay of fair quality. No water-powers, stone quarries, coal, lignite veins nor minerals of economic value were found. The weather was very fine in the spring with occasional showers when the eastern part of the township was being surveyed. When the western part was being surveyed in the fall the days were bright and the weather settled but cold, the thermometer reaching sometimes twenty degrees below zero. Game, although not plentiful, consisted of rabbits, ducks, coyotes, foxes and a few black and cinnamon bears.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

Township 41.—The soil of this part of the township is a dark loam on clay subsoil while the land next to the base line is marshy with a thick growth of willows and is third-class in value. The northerly part of the land embraced within the limits of the survey is first and second-class, and is timbered with poplar from six to ten inches in diameter, and willow. A belt of spruce from eight to eighteen inches in diameter is located in section 12 on the south side of Barrier lake. The water is good and fresh and the supply permanent. The weather was very fine at the time of survey, clear bright days with occasional spring showers. Fuel can be obtained in abundance. No stone quarries, coal, lignite veins nor minerals of any economic value were found. Rabbits, partridge, black bears and coyotes were frequently seen. Fish were plentiful (pike species), in Barrier lake.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

Township 49.—The soil varies from six to twelve inches of black loam, sand and clay subsoil. The surface is flat and covered with thick willow. There are a few ridges of poplar up to four inches in diameter and a few six-inch spruce. Large hay sloughs

6-7 EDWARD VII., A. 1907

occur in the southern and western portions of the township. There is fresh water and the supply appears to be permanent. A branch of Carrot rive runs through this township, also several small creeks, probably dry in summer. No water-powers occur. The climate is dry. No snow fell in 1905, with the exception of two slight storms which left a depth of about two inches. No wood occurs. No stone quarries nor minerals occur. A few moose, elk, jumping deer, foxes, partridge and prairie chickens were seen.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 38 (North part).—The quality of soil is first-class, being twelve to sixteen inches black loam on clay subsoil. The classification in the field notes is second and third-class on account of the extent of wet lands. Clearing of the land with drainage improvements will make these flat areas excellent hay lands. The surface is flat and timbered with small poplar and willow scrub of no commercial value, but it answers for fuel. Some excellent hay grows on the flats and open marshes. Good fresh water was found in abundance. No water-powers, stone quarries or minerals of economic value were found. The weather at the time of survey, in February, was fine, the thermometer standing at zero. Rabbits, foxes and coyotes were plentiful at the time of survey. Ducks, woodcock and curlew are plentiful throughout the summer season.—*A. G. Cavana, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 39.—The soil in this township is a black loam, eight to sixteen inches in depth on clay subsoil, and is first and second-class in quality. At least seventy per cent of the area of the township when cleared and properly drained will be good agricultural lands. The township is timbered with poplar from four to six inches in diameter, and willow. Some large poplar are found on sections 25 and 36 from eight to eighteen inches in diameter. Forest fires of former years have destroyed a considerable quantity of large trees at the central part of the township. Occasionally a few spruce in small clumps are seen. No hay of any account is found in this township. The weather at the time of the survey was clear and cold, the thermometer ranging from twenty to thirty-five degrees below zero. No streams or water-powers of any importance occur. No stone quarries, coal, lignite veins nor minerals of any economic value were discovered. Rabbits, partridge, coyotes and foxes were plentiful, and some black bears and moose were seen.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 40.—The soil in this township on high or undulating surface is a dark loam four to twelve inches in depth on a clay subsoil; the wet marshy part which is of considerable extent is a deep black loam. Twenty per cent of the area of this township is first-class agricultural land and drainage improvements would reclaim thirty per cent more. The balance of the township is either marsh, swamp or sloughs; the swamps and marshes being submerged the greater part of the year to depths of from twelve to eighteen inches. The township is timbered throughout with poplar from two to six inches in diameter, and willow with stunted tamarack from four to ten inches in diameter, on swampy land. Some scattered spruce occur throughout the township though nowhere worthy of special mention. No hay marshes of any value were seen. Abundance of good fresh water is easily obtained. No water-powers occur within the township. Good dry fuel, such as poplar, that had been killed in former years, is plenti-

SESSIONAL PAPER No. 25b .

ful. No stone quarries, coal, lignite veins nor minerals of economic value were found. The weather during survey was fine, bright and frosty, the thermometer, ranging from twenty to thirty degrees below zero. Rabbits and partridge were seen in great numbers; moose, black bears and coyotes were numerous.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 41.—The soil of this township is from four to fourteen inches of black loam on clay or sandy loam on sand and clay subsoil, with also some stony land. The soil is generally second and third-class with considerable wet swamps of flooded areas. The township is timbered with poplar from four to six inches in diameter and willow scrub. A considerable quantity of tamarack and scattering small clumps of spruce are located throughout the township, the tamarack being from six to eight inches in diameter, and the bulk of the spruce of the same dimensions with a few trees from twelve to eighteen inches in diameter. Barrier river which crosses the northwesterly angle of the township is very irregular in course winding backwards and forwards across a valley about ten chains in width. The width of this stream in ordinary low water is about one chain and it flows with a slow current. No water-powers occur. Hay of good quality grows on the flats of the Barrier river and also around the sloughs. Abundance of good dry spruce and poplar can be obtained for fuel. The weather was very good for the fall of the year with occasional snow flurries. Snow towards the end of the survey fell to a depth of ten inches, but it was very light and dry. Sloughs and marshes were in good safe condition for travel. No stone quarries, coal, lignite veins nor minerals of economic value were found. Rabbits, partridge, coyotes and foxes were numerous and some jumping deer and moose were seen.—*A. G. Cavana, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 42.—The southern part of the township has a high rolling surface and the soil is generally sandy loam on clay subsoil. The central part of the township is flat with some swampy land; the soil is black or sandy loam on clay subsoil. The soil in the northern part of the township is black loam from four to fourteen inches in depth on a clay subsoil. Twenty per cent of the township is first-class and forty per cent is second and third-class agricultural land. Timber, is poplar, two to eight inches in diameter, and willow, with some fair tamarack and spruce along the banks of Barrier river, and a few small clumps of spruce throughout the township. The only location worth special mention is four acres of excellent large spruce twelve to twenty-six inches in diameter on section 36 of this township, near the northwest corner of said section. There is not sufficient timber in the township for a timber berth but it is valuable to settlers for building material and fuel. There is some excellent hay and pasture land in the north part of the township. Water in abundance is found throughout the township, fresh and good. Barrier river crosses the southeast part of the township; it traverses a flat twenty chains in width, is from one to two chains in width, from two to four feet deep, with a slow current. No water-power is found on this river or anywhere in the township. There is abundance of good dry poplar and spruce scattered throughout the township; the timber having been killed by forest fires of former years. The weather at time of survey in January was very fine with bright, clear, frosty days, the thermometer ranging from twenty to forty degrees below zero. No stone quarries, coal, lignite veins or minerals of any economic value were found. Rabbits, partridge, coyotes and foxes were plentiful and some jumping deer were seen in the central part of the township.—*A. G. Cavana, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 14.

Township 49.—There is from six to twelve inches of vegetable soil on six inches of clay and sand subsoil. The surface is rolling and covered with small poplars, with also occasional six-inch poplars and clusters of eight-inch spruce and tamarack. There are several large hay sloughs. A branch of Carrot river has on either side of its banks good hay. This branch flows from the northwestern part of the township in a southeasterly direction at the rate of three miles per hour. The fresh water in the creeks appears to be permanent. No land is liable to be flooded. No water-powers occur. The climate is dry. No snow fell in 1905, with the exception of two slight storms which left about two inches. Wood is the only fuel. No stone quarries nor minerals occur. A few moose, elk, deer, foxes, partridge and prairie chickens were seen.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 15.

Township 49.—There are from four to six inches of vegetable soil on a sandy clay subsoil. The surface is rolling and covered with small poplar as well as a few six-inch poplars, clusters of eight-inch spruce and a few jackpines. There are a few large hay sloughs in the southeast portion of the township. The water in the sloughs is alkaline and they are probably dry in summer. There are a few small fresh water brooks. No land is likely to be flooded. No water-powers occur. The climate is dry. There was no snow at the time of survey in 1905, except two slight storms which gave only about two inches of snow. Wood is the only fuel. No stone quarries nor minerals occur. A few moose, elk, deer, foxes, partridge and prairie chickens were seen.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 15.

Township 50.—The nature of the soil is sandy. The whole surface is covered with small poplar, with some scattered six-inch poplar and eight-inch spruce. There is no hay. A few fresh water creeks are found, but with the exception of the flats along the river no land is liable to be flooded. At the Nepawin rapids there is an estimated fall of fifteen feet in half a mile while below this rapid there is another one with probably ten feet of a fall. The banks on either side are high, which would allow for the developing of water-powers by constructing a dam. The climate is dry and the snow-fall light. Wood is the only fuel. No stone quarries nor minerals occur. Moose, elk-jumping deer, foxes, partridge and prairie chickens are found.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 16.

Township 49.—There are from six to eighteen inches of vegetable soil on a sandy-clay subsoil. The northern tier of sections is open scrub prairie. South of this the surface is rolling and covered with small poplars as well as a few six-inch poplars and clusters of eight-inch spruce, tamarack and a few jackpines. No hay sloughs worth mentioning occur. The water is alkaline in the sloughs which are liable to dry up in summer. There are a few fresh water creeks. The land is not liable to be flooded. No water-powers occur. Wood is the only fuel. The climate is dry. No snow fell in 1905, with the exception of two storms, each about two inches deep. No

SESSIONAL PAPER No. 25b

stone quarries nor minerals occur. There are a few moose, elk, deer, foxes, partridge and prairie chickens.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 16.

Township 50.—The nature of the soil is sandy. The surface is rolling and broken by valleys near the edge of the river. A few small scrub spruce and willows are found on the river bank. There are no hay marshes and no streams of water, except the river, on which a considerable fall occurs, being about ten feet across the range. The climate is dry and the snowfall light. No stone quarries and no minerals occur. Moose, elk, jumping deer, foxes, partridge and prairie chickens are quite plentiful. The shore of the river is covered with granite boulders and also a few limestone boulders.—*A. L. MacLennan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 3.—This township was reached by me from Goose lake trail (Old Bone trail) by travelling south along the east outlines of townships 5 and 4, range 18. The country is rough and hilly and the trail presented heavy grades. The township is crossed diagonally by the police trail running in a southwesterly direction from Weyburn to the Northwest Mounted Police station at Wildman butte, on the international boundary, and this trail is in good condition. The soil is chiefly sandy loam on clay or sandy subsoil and is rather light for farming. The surface is everywhere prairie. The north and south outlines are hilly and rough, while the central part of the township is in the form of a basin, and is gently rolling. No timber occurs. Hay is to be had in the numerous hay marshes and is chiefly red top and marsh-grass of good quality. A marsh containing about one hundred acres occurs in section 2. Fresh water is fairly plentiful in the sloughs and marshes. Crystal, Alma and Wellington lakes are alkaline. No streams occur. No water-powers occur. The climate is dry and warm. There were no frosts at the time of the survey. No fuel occurs. Coal and wood for camp purposes were obtained at Yellowgrass. No stone quarries nor minerals occur. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 4.—This township was reached from the Goose lake trail in section 2, township 6, range 18, by travelling south along the east outlines of townships 5 and 4, range 18. This route is very hilly and presents heavy grades. The soil is chiefly sandy loam on a sandy subsoil, with gravel in places and is only adapted to grazing. It supports a good growth of buffalo grass. The surface is everywhere prairie. It is very rough and hilly throughout. The hills are from 25 to 100 feet in height but low hills predominate. No timber occurs. Hay is abundant in the numerous hay marshes and is chiefly redtop and marsh grass of good quality. Fresh water is plentiful in the hay marshes and sloughs. Several alkaline lakes occur. No streams occur. No water-powers occur. The climate is dry and warm. There were no frosts at the time of the survey. No fuel occurs. Coal and wood for camp were obtained at Yellowgrass. No minerals occur. No stone quarries occur. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17

Township 18.—This township is reached by the main line of the Canadian Pacific railway passing through section 3 in which the flourishing town of Balgonie is situated. The soil of this township is first-class, black and sandy loam being the alluvial soil, with a clay subsoil. It is most suitable for wheat growing and also vegetables. Some of the heaviest crops in Saskatchewan were threshed in this vicinity. The surface is level in the southern portion but undulating and rolling in the northern. Small clumps of poplar are scattered throughout the township, heavier and more numerous towards the north, but all second growth and not of commercial value. Hay sloughs are very few. The ponds and marshes shown on original plan of survey are quite deep and contain good water. The best water is obtained from a creek running easterly across sections 19, 20, 21 and 22, which is twelve to sixteen inches deep and from three to six feet wide. Several government wells have been sunk in this township. The northeast corners of sections 9 and 11 and the northwest corner of section 31, have each one, but they are little used, as this township is an old settlement with a well on each homestead. The climate in this vicinity is quite desirable and from information received, there are very few summer frosts that do any injury. There is no fuel, it having to be brought from the north, twenty or thirty miles by trail or by railway. There were no indications of coal or other minerals, but there are great quantities of limestone and boulders lying on the surface, more especially in the southern part of the township. Great quantities of these have been gathered by the farmers and piled at the corners of the section, completely covering the original survey monuments thus most effectively preserving them. A few ducks and chickens are the only game in this vicinity.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 20.—This township was reached by a direct good trail running north from Balgonie. The alluvial soil of this township varies from two to six inches of black loam with a sandy-clay subsoil. This soil is most suitable for raising wheat, oats, barley and vegetables. The surface of this township may be said to be level prairie interspersed with clumps of poplar, willow and scrub. The largest poplar having a diameter of five inches is good only for fencing purposes. This timber or bush is about evenly distributed throughout, perhaps a little heavier towards the northwest. There are a few hay sloughs, but of small importance, the largest being in sections 3 and 4. Numerous ponds and sloughs supply abundant water which is fresh and sweet, but there are no streams, nor is the land liable to be flooded. The climate is excellent as very few summer frosts visit this locality. As this township is settled, the farmers obtain their fuel from their own land. The fuel supply is limited. There are no indications of coal or minerals or stone quarries. Game is very scarce and consists of a few chickens, partridge and rabbits. The post office of Hednesford is situated in the southwest quarter of section 10, the mail arriving from Balgonie once a week.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 26.—The east boundaries of sections 2 and 11 and the north boundaries of sections 11 and 12 run through a bluffy country, much broken by sloughs and lakes. The soil ranks second-class and the timber is generally of use only for fuel and fencing, though some of it may be found suitable for building purposes.—*P. R. A. Belanger, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 49.—This township is reached by wagon trail from Fort a la Corne. There are from three to six inches of vegetable soil, with a sandy-clay subsoil. The surface is rolling and covered with small poplars. There is an occasional six-inch poplar and clusters of eight-inch spruce and tamarack. There are a few small hay sloughs and small fresh water creeks. The land is not liable to be flooded. No water-powers occur. The climate is dry. No snow fell in 1905, with the exception of two slight snow storms which left a depth of about two inches each. Wood is the only fuel found. No stone quarries nor minerals occur. There are a few moose, elk, deer, foxes, partridge and prairie chickens. A wagon road leads from Melfort on the Canadian Northern railway to this township.—*A. L. Maclellan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 17.

Township 50.—The soil in this township is sandy and the surface of that portion of the township surveyed is broken by numerous small valleys running into Saskatchewan river. The timber is mostly small poplar with here and there more or less scrub. Near the river it is covered by spruce, poplar and willow. No hay meadows are to be found. There is a small supply of water in the valleys running into the river. No water-powers occur. The climate is dry and very little snow fell up to date of survey. Wood is the only fuel. No stone quarries nor minerals occur. A few moose, elk, jumping deer, foxes, partridge and prairie chickens were seen.—*A. L. Maclellan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 18.

Township 3.—This township was reached from township 4, range 17, by travelling westward along the north boundaries of townships 3, ranges 17 and 18. The country is rough and hilly and this route presented heavy grades. The soil varies from black loam on clay subsoil, to sand loam on sandy subsoil, and in a few places gravel. It is only suited to grazing. The surface is everywhere prairie and is rough and hilly in the greater part of the township. The western two tiers of sections are less rolling and in places level. No timber occurs. Hay is plentiful in the hay marshes which occupy many of the hollows. It is marsh grass and red-top of good quality. Fresh water is to be had in the hay marshes and sloughs and was fairly plentiful at the time of the survey, although it would probably be scarce at the end of a dry summer. The four lakes in the township are alkaline. No water-powers occur. The climate is dry and warm, and might be described as moderate. No frosts occurred during the time of the survey. No fuel was found. Coal and wood for camp purposes were obtained at Yellowgrass. No stone quarries nor minerals were found. The only game is antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 18.

Township 4.—This township was reached from township 3, range 18, by travelling west along the north boundaries of townships 3, ranges 17 and 18. The country is hilly and the trail presented heavy grades. The soil is chiefly sandy loam and sandy subsoil, with some black loam and clay subsoil in the northwestern part and in places gravel (near the lakes). It is only suited for grazing purposes. It supports a fair growth of buffalo grass. The surface is everywhere prairie. It is roughly rolling and

6-7 EDWARD VII., A. 1907

hilly almost throughout. No timber occurs. Hay is plentiful in the numerous hay marshes and is chiefly marsh grass and redtop, of good quality. Fresh water is to be had in the hay marshes and sloughs, which are numerous. The lakes in the township are salt. No water-powers occur. The climate is dry and warm. No frosts occurred at the time of the survey. No fuel occurs. Coal and wood for camp were obtained at Yellowgrass. No minerals were found. There are no stone quarries. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 19.

Township 5.—The township was reached from township 5, range 20, by travelling along the north boundary of townships 5, ranges 19 and 20 which affords easy access. The soil is a black loam on clay subsoil in the southern and eastern portion of the township and is suited to all classes of agriculture, while the remainder of the township is hilly and the soil sandy and stony. It, however, supports a strong growth of grass and is excellent grazing land. The surface is everywhere prairie. It is rolling in the south and east parts and roughly rolling and hilly in the remaining part. No timber occurs. Hay is abundant throughout the township in the numerous small marshes which occur in the low ground. It is marsh grass and redtop, of good quality. The water in the township is fresh and permanent, and is found in the lakes and numerous marshes. No streams nor water-powers occur. The climate is moderate with no frosts at the time of the survey. No fuel nor stone quarries occur in the township. No economic minerals occur. The only game is duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 19.

Township 6.—This township was reached by the old patrol trail to Willowbunch which crosses the northern part of the township, and which, at the time of the survey, was in excellent condition. The northwest half of the township (approximately) is composed of a dark loam on a clay subsoil and is good farming land, while the remainder lying to the southeast is roughly rolling and hilly and only suitable for grazing. The surface is everywhere prairie. No timber occurs. Hay is fairly plentiful in the southeast part in the numerous hay marshes. The northern part of the township is crossed by Gibson creek which at the time of the survey was not running. Water was, however, standing in occasional deep holes. The creek has cut a bed about fifteen feet deep and the adjoining land is not liable to flooding. No water-powers occur. The climate is moderate, with no frost at the time of the survey. Fuel is very scarce. Occasional bunches of small willow are to be found along the bed of Gibson creek, but this supply has been almost exhausted by the settlers this summer. No coal was found. No economic minerals occur. The only game is ducks, geese and antelope. A few pike are found in Gibson creek.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 19.

Township 7.—This township was reached from township 7, range 20, by means of the old patrol trail running westerly from Weyburn to Willowbunch. It follows the correction line closely and was in excellent condition at the time of the survey. The soil is chiefly sandy loam on a sandy or clay subsoil, but in places it becomes a black loam on clay, while in the hills it is gravelly. Except in the central western part, where the hills from the northwest break off, the township is excellently suited for

SESSIONAL PAPER No. 25b

agricultural purposes. The surface is prairie. No wood of any kind occurs in the township. The surface is generally rolling but in the southeastern part is level, and in the central western part hilly. But few hay marshes of any size occur. The largest is in the southwest quarter of section 26, and contains about seventy-five acres. Another occurs in section 15 to the northwest of Cockburn lake and contains about seventy-five acres. Small marshes are frequent in the more rolling (western) part of the township. The water in the hay marshes at the time of the survey was fresh. The water in Cockburn and Kinghorn lakes is alkaline. A dry creek-bed crosses the south outline several times. At the time of the survey there was no water running in it, but fresh water was standing in the deeper holes. This appears to be a branch of Long creek. Its banks are from ten to fifteen feet high which removes any possibility of flooding. No water-powers occur. At the time of the survey the climate was moderate, with a great deal of rain. No frosts occurred. No fuel—either coal or wood—was found in the township. No stone quarries occur, and no economic minerals were found. The only game is duck and antelope. The even sections in this township had nearly all been squatted upon by the time the survey was completed, and land seekers were daily coming into the country. This section of country is locally known as the 'Gap.' The hills break here and leave a big tract of good farming land which stretches to the west and southwest.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 19.

Township 8.—The township was reached by a trail running in a southwesterly direction from Yellowgrass; it is the trail used by the farmers in the vicinity and a branch of it continues to Willowbunch. From the point where it branches to the west to Willowbunch I continued to the southwest to the centre of the township. The soil is a sandy loam over clay, the loam varying from two to six inches. It is considered by a number of land seekers, who have visited my camp, of excellent quality for wheat-raising, but cannot be classed as number one along with the richer black loam land situated near Yellowgrass. However, there is the opinion that some of the richer soils are too heavy for early ripening of grain. The surface is gently rolling prairie. Dry lake is the only source of water in the township. Its water is fresh and permanent. It was without outlet at the time of the survey; its banks are well defined and there is little danger of flooding. A large hay marsh surrounds the northeasterly part of Dry lake in section 22, containing about fifty acres. No other hay marshes of any extent were seen. No water-powers occur. The climate is temperate and there were no frosts at the time of survey. No wood occurs in the township and no coal. Firewood for the camp was hauled from a coulee, eight miles east of Dry lake. No stone quarries nor economic minerals occur. The only game is geese, duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 20.

Township 5.—This township was reached from township 5, range 21, by travelling along the north boundary of the township giving a good trail with no grades. The soil, almost throughout the township is a black loam over a clay subsoil, and is good farming land. Immediately adjoining the south boundary it becomes sandy and rolling, and is only grazing land. The surface is everywhere prairie. Hay is plentiful in the numerous small hay marshes and is marsh grass and red top. Fresh water is plentiful in the sloughs and marshes. Several lakes occur in the southeast part of the township which are slightly alkaline. No streams nor water-powers occur. The climate is moderate with no frosts at the time of the survey. No fuel was found in the township and fuel for camp was obtained at Yellowgrass. No stone quarries nor economic

6-7 EDWARD VII., A. 1907

minerals were found. The only game is geese, duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 20.

Township 6.—This township was reached from township 6, range 19, by my own trail westward. The country through which the trail passes is gently rolling, so that there are no heavy grades on it. The soil is of excellent quality, being chiefly black loam to a depth of from four to six inches on a clay subsoil. It is suited for all classes of agricultural purposes. The surface is gently rolling prairie throughout. No timber occurs in the township. Hay is plentiful in the township. A marsh containing about fifty acres occurs in the north part of section 35. Small hay marshes are numerous being found in the hollows. The hay is a good quality of marsh grass and redtop. The water throughout the township is fresh and at the time of the survey was plentiful, but it is probable that at the end of a dry summer it would be scarce. Two dry creek beds cross the southeastern portion of the township in a general northeast direction. No water was flowing in them at the time of the survey but the deeper holes still contained a small quantity of fresh water. These streams have cut channels from ten to twenty feet deep so that there is no danger of flooding and they afford natural drainage for the adjoining land. No water-powers occur. The climate was moderate at the time of the survey with frequent rains. No frosts occurred. No fuel was found in the township; coal and wood for camp purposes being obtained at the railway at Yellowgrass. No stone quarries nor economic minerals occur. The only game is antelope and duck.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 20.

Township 7.—This township was reached from township 7, range 21, by the old patrol trail to Willowbunch which runs westerly along the southern boundary of township 7, in ranges 19, 20 and 21. It was in excellent condition at the time of the survey. Roughly speaking, the northwest half of the township lies in the hills, and the soil in this part is light, being chiefly a sandy loam on a sandy or gravel subsoil and is only suitable for grazing purposes, while the southeastern portion is less rolling and the soil a black loam or a sandy loam on a clay subsoil and is suited for agricultural purposes. The surface is rolling prairie. No timber occurs. A large hay marsh occurs in section 6 containing about one hundred acres. The hay is chiefly redtop of excellent quality. Also a large hay marsh in the southwest part of section 1 containing about seventy-five acres. Throughout the township also in the hollows between the high ground are numerous small hay marshes, so that it is everywhere plentiful. At the time of the survey the numerous hay marshes and sloughs all contained fresh water, but it is probable that toward the end of a dry summer water would be scarce. No streams occur. The land is not liable to flooding. No water-powers occur. The climate is moderate with no frosts at the time of the survey, and is well suited for agriculture. A good deal of rain fell during the time of the survey. No fuel occurs in the township. Coal for camp purposes was obtained from Yellowgrass. No stone quarries occur. The only game is duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 20.

Township 8.—This township was reached from township 8, range 19 by an old trail which we were able to pick up west of Dry lake, running in a westerly direction through about the centre of the township. The soil is a sandy loam, over a clay and

SESSIONAL PAPER No. 25b

sandy subsoil; the subsoil varying between these two; and is suited to all classes of agriculture. I have classed part of it as number one and part as number two, some of it being of very fine quality, although nowhere was the very rich black loam encountered. The surface is rolling prairie throughout with some rough hilly country in the southwest corner. No timber occurs. A hay marsh containing about seventy-five acres occurs in sections 14 and 15; no other hay marshes of any size were found, although small grassy sloughs are numerous throughout. The water is fresh and everywhere obtainable, the sloughs being all well filled at the time of the survey. It is probable, however, that toward the end of the summer, water will be scarce. No streams occur and no water-powers. The climate is moderate with hot days and cool nights. A slight frost occurred on the night of May 27. No wood nor coal occurs in the township. Wood for camp was obtained in a very rough ravine in township 9, range 20. No stone quarries occur. No economic minerals were found. The only game is duck, geese, grouse and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 21.

Township 5.—This township was reached from the old patrol trail to Willowbunch, by my trail in a southwest direction across township 6, ranges 19 and 20 which afforded easy access. The soil is a sandy loam over a clay and sandy subsoil and in the easterly part of the township is suited to farming. The westerly portion, however, is too rolling for cultivation, but is good grazing land. The surface is everywhere prairie. No timber occurs. Hay is plentiful in the numerous small hay marshes and is marsh grass and redtop of good quality. Fresh water is abundant in the sloughs and marshes. No lakes occur, however, and at the end of a dry summer it would probably be scarce. No streams nor water-powers occur. No fuel occurs and fuel for the purposes of the camp was obtained from dealers in Yellowgrass. No coal nor lignite was found. No stone quarries occur. No economic minerals were found. The game is duck, geese and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 21.

Township 6.—This township is reached by the old patrol trail to Willowbunch which crosses the northwest corner. The soil is chiefly a sandy loam over clay and sandy subsoil. The land is everywhere very rolling so that it is unsuited for farming but is excellent grazing land. No timber occurs. Hay is plentiful in the numerous hay marshes which occur in the low ground and is redtop and marsh grass of good quality. Fresh water is found in the numerous sloughs and hay marshes and was abundant at the time of the survey. It would, however, be scarce at the end of a dry summer. No streams occur. No fuel occurs. Fuel for camp purposes was teamed in from Yellowgrass. No coal or lignite was found. The climate is moderate with no frosts at the time of the survey. No stone quarries occur. No economic minerals were found. The only game is duck, geese and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 21.

Township 7.—The township was reached from township 8, range 21, by travelling south over the prairie, a good trail being readily found. The soil varies from black loam to gravel, there being a great variety often within narrow limits. The hill tops are rarely good soil while the hollows are often of rich bottom land. The township

6-7 EDWARD VII., A. 1907

is best adapted for grazing, there being a good growth of grass everywhere. A strip a mile wide adjoining the south boundary should prove, however, excellent farm land. The surface is generally rough rolling prairie. A range of low hills (the highest being one hundred and five feet) crosses the township from east to west, about midway between the north and south boundaries. A strip of level prairie a mile wide adjoins the south boundary. No timber occurs. Hay is abundant throughout the township, small hay marshes being very numerous in the low parts. They are at present partially filled with water. No large hay marshes occur. The hay is marsh grass and red-top. Water is plentiful in the hay marshes and sloughs in the low lands and is everywhere fresh. The land is not liable to flooding to any extent. No streams occur. The climate is moderate. No frosts occurred at the time of the survey. No fuel occurs in the township and no coal was found. Coal for camp was teamed from Yellowgrass. No stone quarries nor economic minerals occur. The only game is geese, duck and antelope. The township is crossed near the south boundary by the old police patrol trail (between Weyburn and Willowbunch). This trail is in good condition and is still travelled.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 21.

Township 8.—This township was reached from township 8, range 20, by continuing along the old Wood Mountain trail which, however, we traced with difficulty in some places. It continues its general westerly direction and provides a good dry route with easy grades. It joins the present trail from Yellowgrass to Willowbunch near the southwest corner of section 16. The soil varies from a sandy loam on a clay subsoil to a sandy loam on a sandy subsoil and has been classed as one and two. It supports a strong growth of grass and is suitable for all classes of farming. The surface is rolling prairie. In the north along the third base line the surface is hilly, the hills ranging from thirty to forty feet, but these all break off within a mile to the south and give place to rolling country. No timber occurs in the township. Hay occurs in the numerous sloughs which occupy the low ground between the rises, and is plentiful throughout the township. One large hay marsh containing about seventy-five acres was crossed by the east boundary of section 20. The hay is marsh grass and redtop. Water is all fresh and was abundant at the time of the survey. Toward the end of a dry summer it might be scarce, but could doubtless be obtained at any time by digging a few feet. No streams occur. The land is not liable to flooding. No water-powers occur. The climate is moderate and not liable to summer frosts. No frosts occurred at the time of the survey, toward the end of May. No wood nor coal occurs in the township. Firewood for the camp was obtained from township 9, range 20. No stone quarries nor economic minerals occur. The only game is geese, duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 21.

Township 45.—This township is reached by a graded surveyed trail from Prince Albert to Carrot river settlement. The soil throughout this township is first-class, the alluvial soil being rich black loam varying in depth from four to eighteen inches with clay subsoil most suitable for the cultivation of wheat, oats, flax and vegetables. This township is well under cultivation, parts of it being under crop since 1880 and forms part of the renowned Carrot river settlement. The surface is level throughout, quite low and swampy in the eastern part, all partly covered with clumps of second growth poplar and willow. The timber is only fit for fencing and fuel. There are numerous lakes and swamps scattered over this township, most

SESSIONAL PAPER No. 25b

of the latter furnishing a fair amount of good hay. As a rule the farmer utilizes his wheat straw for cattle, &c., thus minimizing the amount of hay that otherwise would be required. Fresh water is most plentiful, the unusual number of lakes and sloughs supply more than sufficient at all times, and Carrot river, a stream about one hundred feet wide and three to four feet deep flows northerly across the centre of the township, but the water is not the best for drinking, being slightly alkaline. The bottom of the river is soft and muddy, the banks low, current about two to three miles per hour. In several places there are small rapids. Except the eastern part of the township and along Carrot river, where it flows out of Waterhen lake, the land is not perceptibly flooded. As the lakes and river were frozen at time of survey, I could not well ascertain the height of falls or rapids, but am under the impression that by the construction of a few dams a sufficient horse-power could be developed to operate quite a large plant. From personal observation and inquiry I learned that the climate is excellent and summer frosts of no serious consequence. I might say I saw several settlers ploughing as late as the 23rd of November, although the lakes were frozen by the 20th of October. Fuel is a scarce article, the little obtainable, being gathered from the larger clumps of poplar and from Birch hills about ten or twelve miles west. I saw no indications of coal or lignite, and the only stone (a species of limestone) is obtained from the bed of Carrot river. There are no minerals. A few jumping deer, coyotes, foxes, mink, muskrat, partridge and duck constitute the game in this district. The new little thriving town of Kinistino, on the Canadian Northern railway has a population of two hundred and fifty, a large grain elevator, and is located in the southeast quarter of section 29. As soon as the bridge over the south Saskatchewan is completed, there will be a daily train service, thus connecting Prince Albert with Winnipeg by a different route and opening a fine new productive district.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22.

Township 5.—This township was reached by the trail which runs from Milestone to Big Muddy creek. It runs southerly through sections 32, 29, 19, 18, 7 and 6 and was in good condition. The soil varies from a black loam on clay subsoil to sandy loam on gravel subsoil and owing to the character of the surface is only suitable for grazing. The surface is rolling in the northern and central parts and hilly in the south and is everywhere prairie. No timber occurs. Hay is plentiful in the numerous hay marshes which occupy the low ground. It is marsh grass and red top of good quality. Four lakes (alkaline) occur, but good fresh water is abundant in the sloughs and hay marshes; no streams occur. The land is not liable to flooding. No water-powers occur. The climate is moderate, with slight frosts at the time of the survey. No fuel was found in the township; but coal for camp purposes was obtained on the east shore of Coalmine lake in section 3, township 5, range 23. No stone quarries nor minerals were found. The only game is antelope, geese and duck.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22.

Township 6.—This township may be reached by either the old patrol trail from Weyburn to Willowbunch, which runs westerly through the northern part of the township; or by the trail from Milestone to Big Muddy creek which crosses it from northeast to southwest. These trails cross just north of a prominent hill called the 'Big butte,' where there are several springs and a well-known camping ground for travellers. The soil is a black loam over clay subsoil in the valleys and sandy loam over gravel or sand on the hill tops and is best suited for grazing purposes. The surface is chiefly

6-7 EDWARD VII., A. 1907

rolling and hilly prairie. Some level land occurs along the Willowbunch trail which is good farming land. No timber occurs. Hay is abundant in the numerous hay marshes, which occupy the hollows between the hills. It is marsh grass and redtop of good quality. Fresh water is everywhere to be found in the hay marshes and sloughs. Several springs pour a continual stream of water out of the 'Big butte' forming a permanent supply. The land is not liable to flooding. No water-powers occur. The climate is moderate with no frosts at the time of the survey. No fuel, nor stone quarries nor minerals occur. The only game is antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22.

Township 7.—This township is crossed in its southeast part by the trail from Milestone to Willowbunch and the Big Muddy creek. This trail crosses sections 13, 12, 11 and 2 and is in good condition. The soil in the northern two-thirds is chiefly black loam to a depth of three or four inches over clay subsoil. It is gently rolling or rolling and is good farm land. In the southerly third, however, the soil is of lighter quality and the surface hilly so that it is only suited to grazing purposes. The surface is everywhere prairie. No timber occurs. Hay is plentiful in the numerous hay marshes, especially in the south part and is chiefly marsh grass and redtop of good quality. Fresh water is plentiful in the numerous hay marshes and sloughs and the supply is permanent. Weicker lake in section 3 containing about one hundred acres is fresh. No streams occur. No water-powers occur. The climate is warm and pleasant. No frosts occurred at the time of the survey. No fuel occurs. Coal and wood for camp purposes were obtained at Yellowgrass. No stone quarries occur and no economic minerals were found. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22.

Township 8.—The township was reached from the intersection of the Willowbunch trail with the north boundary of township 7, range 21, west of the second meridian, by travelling west along the north boundary of township 7, ranges 21 and 22, and this afforded a good route. The soil in the north part is a sandy loam on sandy subsoil and is rather light. In the south part it is a black loam on clay subsoil and is excellent farming land. The surface is rolling in the north part of the township and gently rolling or level in the south part and is everywhere prairie. No timber occurs. Hay occurs plentifully in the numerous hay marshes throughout the township. A marsh containing about fifty acres occurs in the northwest part of section 7. The hay is marsh grass and redtop of good quality. Water is plentiful in the numerous sloughs and hay marshes and in the small lakes in sections 33 and 35 and is in all cases fresh. No streams occur. No water-powers occur. The climate is moderate with frequent showers. No summer frosts occurred at the time of the survey. No fuel occurs. No stone quarries occur. No economic minerals were found. The only game seen was wild duck and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22.

Township 45.—This township can be reached by various trails from all directions. The one we followed from Birch hills being the surveyed trail from Prince Albert to Carrot river, a well graded road, and at all times an excellent trail. The soil of this township and vicinity is of the best quality, being a rich black loam, varying in depth

SESSIONAL PAPER No. 25b

from four to eighteen inches, with a clay and occasionally sandy subsoil. It is most suitable for the cultivation of wheat, oats and vegetables, of which many fine crops were seen. This township comprises part of the famous Carrot river district and is well known for its fertility. The surface is comparatively level, a little rolling in the northwestern portion, besides being low and swampy in many places, and about half covered with second growth poplar and willow in scattered clumps. In the western and southwestern portion of the township the timber is larger and thicker, varying in diameter from 4 to 12 inches, much of it being suitable for building and fencing. Hay of good quality is to be had from around nearly all the ponds and numerous sloughs, the greatest quantity being obtained from the large lake or slough in sections 28, 29, 32 and 33. Good and sufficient water is to be had from the numerous ponds, sloughs and creeks, also from Waterhen lake, a large body of fairly fresh water covering several sections in the southern part of the township. There are no indications that the land is flooded, except, perhaps, a small area adjoining the larger lakes. There are no falls, rapids or water-powers and summer frosts are an unknown quantity. The first snowstorm occurred on the 9th of October, unusually early, and cold weather set in on the 23rd, and by the end of the month the mercury had fallen to 28 degrees below zero, although fall ploughing had been kept up to within a few days of this cold snap. Fuel is a scarce article in this vicinity, the little there is being gathered in the southwest part of the township. However, there is plenty of green standing timber which the settlers cut and dry and which will supply all wants for a long time to come. No indications of coal, minerals or stone were noticed. The Canadian Northern railway crosses section 36, although no scheduled time for trains has yet been arranged as the railway bridge across the south branch of Saskatchewan river is not yet completed. A few jumping deer, some coyotes and foxes were seen in this township. Waterhen lake, which at present is quite low, being nearly covered with long rushes, affords an excellent rendezvous for ducks and geese, and is a sportsman's paradise.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 23.

Township 5.—This township was reached by Lagari's trail, which branches off from the Big Muddy Creek trail, just south of the 'Big Butte' in section 20, township 6, range 22. It runs in a southwesterly direction, from section 35 to section 1, and is in good condition. The soil is chiefly black loam and clay subsoil, with sandy loam and gravel on the high ground. The valley through which the trail runs will make excellent farming land, and the balance, being rolling and hilly, is best suited for grazing. The surface is prairie, varying from gently rolling to hilly. No timber occurs. Hay is found in the hay marshes which occur frequently in the low ground, and is marsh grass and redtop of good quality. A permanent supply of fresh water is to be found in the marshes and sloughs. Coalmine lake, in sections 3, 4 and 9, is alkaline. No streams nor water-powers occur. The climate is moderate, with slight frosts at the time of the survey. A seam of lignite was found on the east shore of Coalmine lake on the south boundary of section 3. The seam, which is about four feet thick, outcrops just above the water line of the lake on the west face of a hill. It is of good quality, and was burned in the cooking range in the camp. It burned readily, leaving, however, a large residue of ash. No stone quarries occur. No minerals occur, except coal. The only game is antelope, geese and duck.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 23.

Township 6.—This township is reached by Lagari's trail to Willowbunch which crosses sections 12, 1 and 2 and is in good condition. The soil is chiefly black loam on

6-7 EDWARD VII., A. 1907

a clay subsoil, with, however, gravel on the hill tops. It supports a thick growth of buffalo grass and owing to the rolling nature of the surface is best suited to grazing. The surface is everywhere prairie. It is gently rolling along the south outline but soon becomes roughly rolling and hilly toward the north. No timber occurs. Hay is abundant in the numerous hay marshes; it is chiefly marsh grass and redtop of good quality. Fresh water is readily found in the sloughs and hay marshes which occupy the low ground. No water-powers occur. The climate is moderate with slight frosts at the time of the survey. No fuel occurs in the township, but lignite of good quality may be obtained in section 3, township 5, range 23. No stone quarries nor economic minerals were found. The only game is antelope, geese and duck.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 23.

Township 7.—The township was reached from township 8, range 22, by travelling west along the north outline, which afforded a good trail. The soil is chiefly black loam over clay subsoil, but the southern one-third is rather hilly and the soil lighter, being sandy loam over sandy subsoil, and this part is not as good farming land as is the northern part. The surface is everywhere prairie. It is rolling prairie, with some low hills on the southern part. No timber occurs. Hay is abundant in the numerous small hay marshes and is marsh grass and redtop of good quality. Fresh water may be easily obtained in the sloughs and hay marshes. No streams occur. No water-powers occur. The climate is moderate, with no frosts at the time of the survey. No fuel occurs in the township, but a good seam of lignite is to be found in section 3, township 5, range 23, west of the second meridian. No stone quarries nor minerals occur. The only game is antelope, geese and duck.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 23.

Township 8.—This township was reached from township 8, range 22, by travelling west along the south outline, which afforded a good trail. The soil is chiefly black loam, varying from three to eight inches over clay subsoil, and is well suited to farming. The surface is everywhere prairie. It is level in the southern half and rolling in the northern half. No timber occurs. Fresh water is abundant in the numerous small sloughs and hay marshes. No streams occur. No water-powers occur. The climate is moderate, with no frosts at the time of the survey. No fuel occurs in the township, but a good quality of lignite may be procured in section 3, township 5, range 23, west of the second meridian. No stone quarries nor minerals occur. The only game is antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 24.

Township 5.—This township was reached from Lagari's trail by travelling west along the north boundary of sections 24 and 23, which afforded a good trail. Lagari's trail crosses sections 13, 12, 11 and 2. The soil varies from black loam on clay subsoil to sandy loam on sandy subsoil and occasionally gravel, but most of the township is suited to farming. The surface is everywhere prairie and is level or gently rolling throughout. No timber occurs. Hay is to be found in the hay marshes which are fairly numerous; it is chiefly redtop and marsh grass of good quality. Water is not so plentiful as in the adjoining township, but several hay marshes contained a good supply of fresh water at the time of the survey (toward the end of September), and the supply is doubtless permanent. No streams occur. No water-powers occur. The

SESSIONAL PAPER No. 25b

climate is dry and warm, there were several sharp frosts at the time of the survey. No fuel was found in the township, but a good quality of lignite is to be had in section 3, township 5, range 23, west of the second meridian, from which a supply was obtained for the camp. There are no stone quarries. No minerals were found. The only game seen was antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 24.

Township 6.—This township is crossed in its northern part from east to west by the trail from Weyburn to Willowbunch, which is in good condition. The soil varies from black loam and clay subsoil to sandy loam and sandy subsoil with gravelly subsoil frequently. The southern two-thirds could be used for farming, but the northern one-third is only suitable for grazing. It supports a good growth of buffalo grass. No timber occurs. Hay is plentiful in the numerous hay marshes, especially in the northern part of the township. It is marsh grass and redtop of good quality. Fresh water is to be had in the numerous hay marshes and sloughs. Lake No. 1, in sections 20, 21, 28, 29 and 30 is alkaline. No streams occur. No water-powers occur. The climate is moderate, with some sharp frosts at the time of the survey. No fuel occurs. Coal for camp purposes was obtained at section 3, township 5, range 23. No stone quarries nor minerals were found. The only game is antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 24.

Township 7.—This township is easily reached from the Willowbunch trail which crosses the northern part of township 6, range 24, and which is in good condition. The soil is a black and sandy loam on a clay subsoil chiefly, but with gravel in places. Owing to the hilly nature of the surface it is best suited for grazing. The surface is everywhere prairie and is roughly rolling or hilly throughout. No timber occurs. Fresh water is abundant in the numerous sloughs and hay marshes. No streams occur. Channel lake (alkaline), occupies the southwest corner of the township, and covers parts of sections 5, 6 and 8. No water-powers occur. The climate is moderate with sharp frosts and some snow flurries at the time of the survey. No fuel occurs. Coal and wood for camp purposes were obtained at Yellowgrass. No stone quarries nor minerals occur. The only game is antelope, duck and geese, and a few prairie chicken.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 24.

Township 8.—This township was reached from the Willowbunch trail by travelling northward along the centre meridian of township 7, range 24. There were some heavy grades on this trail. The soil is a black loam on clay subsoil, and sandy loam on sandy subsoil, with gravel in places. It is only suited to grazing. The surface is everywhere prairie, and varies from gently rolling to roughly rolling. No timber occurs. Hay is plentiful in the numerous hay marshes and is chiefly marsh grass and red top, of good quality. Fresh water is to be found readily in the hay marshes and sloughs, and these afford a permanent supply. Four small lakes occur which are alkaline. No water-powers occur. The climate is moderate with sharp frosts and heavy winds at the time of the survey. No fuel occurs. Coal and wood for camp were obtained at Yellowgrass. There are no stone quarries nor minerals. The only game seen was antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

• *Range 24.*

Township 45.—This township was reached by a fairly good trail from Batoche which enters at the west side of section 19, however, the most usual and best route is from the north by branch trails connecting with the surveyed trail to Prince Albert and which is in township 46. A large hill extends nearly across the township from east to west, and slopes gradually downward, both to the north and south, otherwise the surface is fairly level, broken by an occasional ravine, in which generally is a small stream, but at time of survey, dry. A few bush trails for winter use are cut through parts of the township. There is, however, one good trail from north to south, which extends to the French settlement to the south on Carrot river. The soil is second-class for agriculture in its present condition. It is composed mostly of a rich black loam, from 6 to 18 inches deep, with a clay subsoil. In some places it is sandy loam. When cleared of timber and brush the soil will be suitable for wheat, oats and vegetables. A few crops of wheat were seen on clearings. With the exception of a few sections adjoining the northern boundary of the township, the whole is covered with poplar, willow, hazel and cherry trees. The poplar would average in diameter about 4 inches, although there are some trees of 12 inches diameter. There are also a few scattered birch. It might be advisable to reserve the unoccupied sections for timber, as it is of value for building and fencing purposes. Little or no hay is to be found, a circumstance which caused considerable annoyance and loss of time during the survey. A body of water, known as Jumping lake, covers several sections of the southwest corner of the township, the water of which is very dirty and unfit to use. This lake in the past few years has risen considerably, so much so, that several of the original surveyed lines are now submerged. There are a few creeks in the northern and eastern part, but little water was in them at the time of survey. Upon several occasions considerable inconvenience was felt for want of drinking water. There are no water-powers, or falls. The climate was all that could be desired, the first frost occurring on the second of September. No indications of minerals, coal or stone quarries were found. Bears, moose, jumping deer, wolves, foxes, lynx and rabbits are at times plentiful in the vicinity.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25.

Township 4.—This township is a good deal broken by hills and ravines and is all open prairie. In the northwesterly part there is a large flat, chiefly alkaline being an extension of the part of Willowbunch lake, in sections 31 and 32. There is also a large bottom or flat extending from the lake to the southerly part of the township through which Big Muddy creek runs in high water. The greater part of the soil is very hard, there being very little first-class land. Some of the land, however, could be used for ranching and also for grain growing. The general surface is very rolling, some hills being from one hundred and fifty to two hundred feet high. Along the ravines there is a little scrub, but no timber of any kind. There are a few nice hay meadows in the westerly part of the township from which the ranchers cut a good deal of very good hay. The water is very scarce and is chiefly alkaline. The only stream is the Big Muddy, which in high water must be a large stream, but was dry during the time of survey. It is difficult to cross as the bottom is very soft. The climate seems to be favourable and not subject to frosts. There is no fuel, nor are there any indications of coal or lignite. There are no stone quarries, nor any appearances of such. Game is almost unknown, as there is very little water to be found. The township on the whole is very broken and hilly, and would appear to be better adapted for ranching than for any other purpose, as hay can be easily gotten and also sheltered places for houses and stabling.—*James Warren, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25.

Township 6.—This township is crossed in its northern part from east to west by the trail from Weyburn to Willowbunch, which is in good condition. The soil is chiefly sandy loam over clay subsoil and is well suited for farming purposes. The surface is everywhere prairie and is gently rolling or rolling throughout. No timber occurs. A limited amount of hay occurs in the hay marshes and is marsh grass of good quality. Fresh water occurs in the hay marshes and sloughs and is a permanent supply. Channel lake is alkaline. No streams occur. No water-powers occur. The climate is moderate, with heavy frosts at the time of the survey. No fuel occurs in the township. Wood for camp purposes was obtained from the settlers at Willowbunch. No stone quarries nor minerals occur. The only game seen was ducks, geese and antelope.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25.

Township 7.—This township is crossed in its southwest part by the trail from Weyburn to Willowbunch, which is in good condition. The soil varies from black loam on clay subsoil to sandy loam on sandy subsoil. The southwest half of the township is rolling or gently rolling and is suitable for farming, but the northeast half is rough and hilly and only fit for grazing. The surface is everywhere prairie. Hay is plentiful in the hay marshes, and is chiefly marsh grass and redtop, of good quality. Fresh water is to be had in the hay marshes and sloughs, and was plentiful at the time of the survey. A small lake, in section 9, and Channel lake in section 1, are alkaline. No water-powers occur. The climate is moderate with heavy frosts at the time of the survey. No fuel occurs; wood for camp purposes was obtained from settlers at Willowbunch. No stone quarries nor minerals occur. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25.

Township 8.—This township was reached from township 8, range 24, by travelling west along the north boundaries of township 7, ranges 24 and 25. There are some heavy grades on this trail. The soil varies from clay loam on clay subsoil to sandy loam on sandy subsoil. It supports a good growth of buffalo grass, and is best suited for grazing purposes. The surface is everywhere prairie and is in many places roughly rolling and hilly, so that it is not adapted to farming. The climate is moderate, with heavy frosts and high winds at the time of the survey. Hay is plentiful in the numerous small hay marshes which occur throughout the township. Fresh water is abundant in the hay marshes and sloughs. Lakes Nos. 1 and 2, in section 4, are fresh. Lakes Nos. 3 and 4 are alkaline, although they are fed by springs. No water-powers occur. There is no timber. No fuel occurs. Coal and wood for camp were brought from Yellowgrass. No stone quarries nor minerals were found. The only game seen was antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25

Township 10.—This township is very much broken by hills, lakes, ponds and sloughs, so that there is almost a continuous obstruction which fact tends to lower

6-7 EDWARD VII., A. 1907

considerably the value of the township. In the northern part there are many hills and in the western part there are several lakes and ponds, while in sections 23, 25, 26, 35 and 36 there are also several lakes. Nine lakes in all were traversed. The soil is generally hard and not well adapted for agriculture, and there are not many good grass lands for ranching purposes. The surface is all open prairie, there being no timber or scrub on any part of the township. The water in the lakes is chiefly alkaline, and not fit for domestic use, but stock no doubt would get accustomed to it. There are no streams, and hence, of course, no water-powers. The climate appears to be fair, with nothing to indicate summer frosts. There are no evidences of coal or lignite and no fuel of any kind to be found in this or in any of the adjoining townships. There are no stone quarries nor any minerals of economic value. Game is very scarce, a few ducks being occasionally seen on the lakes. Taking the township as a whole it would not be adapted for farming, yet ranching might be carried on successfully in some sections, as good shelter can be found among the hills for stabling. There is an old trail running through this township from Regina to Willowbunch, which is still sometimes used by travellers and traders. The trail is a very good one and good water can be got along it in some places.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 26.

Township 6.—This township is reached from township 7, range 26, by travelling south from the Willowbunch trail which crosses from east to west within one mile of the north boundary. The soil is chiefly black loam of an average of five inches over clay subsoil, with some sandy loam over clay subsoil, and is well suited for farming. The surface is everywhere prairie, and is gently rolling, or rolling, except immediately adjoining Willowbunch lake where it is broken by coulees. No timber occurs. A limited quantity of hay is to be found in the hay marshes which, however, are not numerous. Fresh water occurs in the sloughs and hay marshes. The water in Willowbunch lake is salt but stock like it. No streams occur. No water-powers occur. The climate is moderate with heavy frosts at the time of the survey. Some dead wood was found in the coulees near Willowbunch lake. No coal was found. No stone quarries nor minerals occur. The only game is ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 26.

Township 7.—This township was reached from township 8, range 26, by travelling south along the east boundaries of sections 24, 27, 22, 15, 10 and 3, which afford a good trail. The township is crossed in its southern part by the trail from Weyburn to Willowbunch which is in good condition. The soil varies from black loam on clay subsoil to sandy loam on sandy subsoil, it is, however, all good farming land. The climate is moderate with heavy frosts at the time of the survey. The surface is everywhere prairie and is rolling or gently rolling. Good hay is to be found in the numerous hay marshes throughout the township. It is chiefly redtop and marsh grass. Fresh water is abundant in the hay marshes and sloughs. No streams occur. A small lake in section 13 is alkaline. No water-powers occur. No timber occurs. No fuel occurs in the township. Wood for camp purposes was obtained from the settlers at Willowbunch. No stone quarries nor minerals occur. The only game is antelope, ducks and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 26.

Township 8.—This township was reached from township 8, range 25, by travelling west along the north boundaries of township 7, ranges 25 and 26.. The soil varies

SESSIONAL PAPER No. 25b

from black loam on clay subsoil to sandy loam on sandy subsoil. It supports a good growth of buffalo grass and affords good grazing. The surface is everywhere prairie. It is roughly rolling to hilly toward the south and east parts, but is more level toward the west and northwest. The climate is moderate with heavy frosts and high winds at the time of the survey. Hay is plentiful in the numerous hay marshes, and is chiefly marsh grass of good quality. Fresh water was to be found at the time of the survey in the hay marshes and sloughs. Lake No. 3 is alkaline, but is fed by springs. No water-powers occur. There is no timber. No fuel occurs. Coal and wood for camp were brought from Yellowgrass. No stone quarries nor minerals were found. The only game seen was antelope, duck and geese.—*J. L. R. Parsons, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 26.

Township 10.—This township on the whole is undulating and in the northern part very hilly, some hills being from two hundred and fifty to three hundred feet high. The southerly part is not so much broken and contains some fairly good land that could be cultivated. There are no hay lands of any extent, what there is, being chiefly short grass. Water in general is not very plentiful, but some ponds have a fairly good supply. In sections 5 and 6 there are two lakes, the water in which is strongly alkaline and not fit for use. There are no streams in the township and of course no water-powers. The climate seems to be favourable and not in any way subject to summer frosts. There is no fuel of any kind to be had on this township or on any of the adjoining townships, nor are there any indications of coal or lignite, nor stone, except the loose stone on the prairie nor economic minerals of any kind. Game is scarce only a few ducks on the ponds and lakes. The township on the whole is not suitable for farming, only part of the south, in which are some sections of fairly good land, and there are some localities that would be suitable for ranching purposes as good shelter can be had in the hilly portions to the north while a fair supply of fuel can be had in the southerly portions and also among the hills.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 27.

Township 10.—This township on the whole is a fairly good township there being many sections of first-class land and good soil. Much of the soil is clay and clay loam, which, when cultivated, would be suitable for grain growing, also for roots. The surface is entirely open, treeless prairie. The surface is undulating and in the eastern part is very hilly and in places the soil is hard and gravelly. There are a few hay marshes in the southerly part of the township, but there are none of any extent that would yield much hay. The water is generally good. The only supply being in the sloughs or hay marshes mentioned above. There are no streams of any kind and consequently no water-powers. The climate seems to be favourable with no indications of summer frosts. There is no fuel to be had on the township nor in the adjoining townships, and there are no indications of coal or lignite. There are no stone quarries, nor any minerals. Game is scarce, owing partly to the scarcity of water. This township would be fairly adapted to agriculture as the soil is of fairly good quality. In some parts the pasturage is fairly good and might be used for ranching purposes. The scarcity of hay would be a drawback for winter use. The trail from Moosejaw to Willowbunch runs past the westerly side of the township which makes it easy of access.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 27.

Township 11.—This is, on the whole, rather an inferior township, there being a great deal of broken, rough and alkaline land in it. The surface is entirely prairie,

6-7 EDWARD VII., A. 1907

very undulating and having many ponds or sloughs. There is no timber of any kind in the township nor in any locality near, so that wood for fuel had to be teamed from Moosejaw. There does not appear to be any hay land or marshes that would yield hay. There are many ponds in which the water is quite alkaline and unfit for use. There are no streams. The only water supply is to be found in the ponds. There is a bay or branch of the Lake of the Rivers in the southwestern part of the township. The water in it is quite alkaline. There are no fixed rocks nor stone quarries to be seen. There is one place near Rivers lake where a sort of coal is to be found, but it does not appear to be in any quantity. There are no streams or springs so there are no mill sites. This township could only be used for ranching, as the soil does not appear to be suitable for farming or agriculture, though the climate appears to be favourable. The trail from Moosejaw to Willowbunch passes through the western part of the township, which makes it quite easy of access at all times as the trail is a very good one—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 27.

Township 12.—This township is very rough and hilly, especially in the northern part, which contains many high hills. The southerly part is less hilly, but the whole township may be classed as hilly. The nature of the soil is very hard clay in most places, but in the southerly part the soil is more loamy and there are a few good sections of land. The soil generally is not adapted for agriculture, but many localities would be suitable for ranching purposes. The surface is prairie, quite open, there being no timber or wood of any kind, not even for pickets. There are no large hay marshes, the only hay being around the ponds and sloughs. There appears to be a permanent supply of water in many places in the sloughs and ponds. For the most part the water is fresh though there is a good deal of alkali in some of the water. There are no streams or springs in any part of the township. The climate appears to be favourable and there are no indications that summer frosts would be common. There is no fuel to be found, nor so far as we could ascertain, can any be found anywhere near this. There are no fixed rocks in any part of the township, but there are in many places plenty of stones that could be used for building purposes. Neither are there any indications of any minerals of any kind. There is no game, only a few ducks. On the whole, this township might be used for ranching purposes, as the pasturage in many places is good and shelter could be found among the hills for stabling. The township is quite easy of access, as the Willowbunch trail passes close to the western boundary. The trail from Moosejaw to Willowbunch is very good and in fair repair.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 28.

Township 6.—This township has considerable good land, especially in the southerly part. The northeasterly part is a good deal broken by a part of Willowbunch lake and by deep ravines and coulees in many places. The soil in the southerly part would be well adapted for farming or ranching as there are some good hay marshes, from which the settlers of Willowbunch get a fair supply of hay. The northerly part is very much broken, and the soil hard and not well adapted for farming. The surface is all open prairie, there being no timber of any account, only a few scrubby bushes and small trees in the ravines. The water in many places is alkaline, but there are a few fresh water sloughs that afford fairly good water. There are no streams of any kind and consequently no mill sites or water-powers. The climate indications are very favourable and does not appear to be subject to summer frosts. There are no fixed rocks in any part, and no signs of coal or lignite, though a species of coal is found in township

SESSIONAL PAPER No. 25b

5 in same range. Game is very scarce, there being only a few ducks on the lakes and ponds. There are no indications of any minerals of any kind. The water in Willowbunch lake is quite alkaline, and not fit for use, being at all times quite muddy. Taking the township as a whole it would be fairly well adapted for settlement and for the growing of wheat and other grains.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 29.

Township 4.—This township is gently undulating to hilly. Some parts are very hilly and the surface all open prairie. The soil is generally loam and in many places very hard, yet if it was broken up it might yield good wheat or other grain. There is no timber of any kind growing on any part of the township. There are some good hay lands situated on the western and northwestern portions. A good deal of hay is cut by the settlers at Willowbunch. The water in the ponds and lakes is generally good, but there is a part of a lake in sections 2, 3, 10 and 11 that is quite alkaline. Some of the ponds and lakes appear to be permanent. There are no streams and consequently no water-powers on any part of the township. The climate appears to be good and there are apparently no summer frosts. There is no fuel of any kind, nor any indications of coal or lignite or minerals of any kind. Neither are there any fixed rocks. Game is scarce, only ducks, of which there are a great many on some of the ponds. Taking the township as a whole it might be fairly well adapted for settling as it is easily reached by trail from Willowbunch, and the land might yield well when broken up. Rain seems to be scarce, which fact accounts for the general surface being dry and hard. There is a part of a lake in the southerly portion and one in the central that have been traversed.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 29.

Township 5.—This township on the whole is a fairly good one, as there are many sections of very good soil, which would be suitable for farming purposes; also there are some good ranching lands. The whole of the township is open rolling prairie, there being no timber of any kind to be found. There are a few good hay marshes from which some hay can be cut, but the quantity is limited. The water generally is fresh, there being little alkali among the ponds. There are no streams of any kind and consequently there are no mill sites or water-powers. Fuel is scarce, there being none in the township, but there are some indications of coal to be found in the adjoining township to the east. Game is scarce, there being only a few ducks on the ponds. There is a good trail running through the township from Willowbunch to Wood mountain, over which route the mail is carried. This township if once broken up would make fairly good land for settlement or for ranching, there being some ponds that hold water all the season. The climate seems to be favourable and does not appear to be subject to summer frosts. In the adjoining township to the east there are some settlers and ranchers who have very fine gardens, growing potatoes and other vegetables with good success.—*James Warren, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 6.

Township 22.—This township is reached by a good trail (alongside the Canadian Pacific railway track), from Moosejaw, as far as Chaplin, fifty-five miles distant, thence northwesterly, a distance of thirty-three miles. The soil of this township is a sandy clay, suitable for wheat and oats in wet seasons and for potatoes and vegetables at all times. The surface is generally level, but rolling in places. It is all prairie

6-7 EDWARD VII., A. 1907

with no scrub or wood of any kind. A few small hay sloughs are to be found in sections 17, 18, 31, 32, 33, 34, 25 and 26, but the quantity of hay is small. Water is very scarce, there being no streams. The only available supply is obtained from the sloughs and marshes. As these sloughs are small they almost dry up in hot weather, and the water which otherwise would be fair, becomes stagnant. Wells were dug to provide water during the survey, during which (about two weeks), the days were hot and the nights cool, but with no frosts. There is no fuel of any description, the nearest being along the banks of south Saskatchewan river, distant six to fifteen miles, where there is a very limited supply. No indications of coal or lignite were visible, nor stone nor metals of any description. The only game seen were antelope and prairie wolves. This township is as yet unoccupied.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 7.

Township 22.—This township was reached from Moosejaw by a good trail following along the main line of the Canadian Pacific railway, as far as Chaplin, distant fifty-five miles. From here is a branch trail running northwesterly to this township thirty-three miles distant. The soil is second-class, being of a sandy clay, excepting along Saskatchewan river, where it is almost sand. Wheat and oats would grow during a wet season and potatoes and vegetables at all times. The surface of the country is undulating, but broken and hilly on its western side by ravines, which extend to the river, thus making an ideal ranching country. With the exception of a few bluffs of cottonwood and poplar close to the river, there is no timber or bush of any description whatever. The only available hay is procured from the lake (now a marsh), situated in sections 13, 14, 23 and 24. Little or no water is to be found, except in the river and the lake or marsh just mentioned. The water is, of course, fresh in the river but quite stagnant in the lake. Fresh water had to be obtained by digging wells whilst at work in the vicinity of the latter. As regards depth, current, volume of water, &c., the river is already well known. There were two weeks work in this township, and the climatic conditions during this time were most favourable in every way. There were no frosts. The only fuel obtainable is a little dead poplar along the river. No indications of coal or lignite veins, nor stone nor minerals of any description were noticed. Antelope, a few prairie chickens and partridge were the only game seen. Two ranchers were located in this township on sections 18 and 30, previous to the survey, however, at the time of survey every quarter section was entered for by a colony of Germans who started building a village on the northeast quarter of section 22.—*E. W. Hubbell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 8.

Township 48.—This township may be reached by way of the mail trail from Duck lake to Aldina, thence by a fairly good trail to the southeast corner of the township. The surface is rolling, without any high hills and the soil is generally clay with stones and boulders scattered in many places over the surface. There are numerous small marshes or sloughs and lakes, some of a considerable size, notably Paddling lake and Grassy lake, on the east boundary. These are fresh water lakes with plenty of fish, such as pike and suckers. There is considerable hay land around Grassy lake, especially in a dry season, as well as many small areas scattered throughout the township. There are no water-falls in the township nor minerals. Deer, moose and elk are fairly plentiful. The township is not suitable for farming purposes being too stony.—*David Beatty, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 9.

Township 48.—This township may be reached by taking the mail route from Duck lake to Aldina, thence by a fairly good trail to the northeast corner of township 47, range 8, where there is a settler engaged in the ranching business. There is no trail extending farther excepting what was made to have the township surveyed. The soil is generally clay and stony, except in low places and around marshes or sloughs where there is black mould. There are numerous small marshes and ponds, or lakes. The lakes are all fresh water. The northern and eastern parts of the townships are rolling and hilly, while the southern portion is low and swampy with considerable areas of willow. The high or dry land is all timbered with poplar, large enough for fuel and fencing. There are a few patches of spruce fringing some of the marshes but none of marketable value. There is a stream about twenty-five feet wide outletting Little Sandy lake, flowing northeasterly with a strong current but with no falls for water-powers. There are no minerals in the township. There are no settlers nor is the township suitable for farming purposes, being too stony—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 12.

Township 27.—At the present time land seekers and settlers coming into this and adjoining townships mostly make use of the trail from Saskatoon, but I am informed that a few came in by way of Hanley station on the Regina and Prince Albert branch of the Canadian Pacific railway. The Saskatoon trail is in very good shape this dry season. The soil is chiefly a rich dark clay loam overlying clay, and is eminently adapted for grain raising. The surface throughout is rolling prairie with no timber whatever. The prairie grass is very short and there are no hay marshes. The southerly end of the large lake in township 28 lies in the northwesterly two sections of this township. The water is slightly alkaline. Very little water was found in the streams flowing into and out of this lake. The water in the sloughs is very shallow, a great many being dry. No snow last winter is the cause of the lowness of the water. While surveying in the month of June wet weather was the rule. On the nights of June 23, 24 and 25 ice formed on pails of water to about one-eighth of an inch in thickness. The prevailing winds were north and northeast. No fuel whatever occurs in the township, but a limited supply of poplar may be obtained at Red Deer lake to the east. No coal was seen. No stone quarries nor minerals occur. Numerous ducks were noticed on the large lake in the northwesterly part of the township and on some of the watercourses. No prairie chickens were seen. A few antelope frequent the area around the lake.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 12.

Township 28.—At the present time land-seekers and settlers coming into this and adjoining townships, mostly make use of the trail from Saskatoon, but I am informed that a few came in by way of Hanley station, on the Regina and Prince Albert branch of the Canadian Pacific railway. The Saskatoon trail is in very good shape this dry season. The soil is chiefly a rich dark clay loam overlying clay, and is eminently adapted for grain growing. The surface throughout is rolling prairie. No timber whatever occurs. The prairie grass is very short and thin, and there are no hay marshes. There is a large lake in the westerly part of the township, the water of which is slightly alkaline. Very little water was found in the streams flowing into and out of this lake. Sloughs are scarce. While surveying in the month of June, wet weather was the rule and for the time of the year exceedingly chilly. The prevalent wind was

6-7 EDWARD VII., A. 1907

north. There is no fuel whatever in the township, but a limited supply can be had at Red Deer lake to the south and east. No coal, stone quarries nor minerals occur. Numerous ducks were noticed on the large lake and in some of the water courses. No prairie chicken were seen. A few antelope frequent the area around the lake.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 13

Township 12.—From the village of Swift Current, Saskatchewan, the Mennonite trail was followed into this township for a distance of twenty miles. The soil is generally a black, sandy, clay loam, ten inches deep, with a sandy clay subsoil. The northern part of the township is gently undulating. The southern portion is easy rolling. No timber occurs in the township. No hay lands proper occur, the native grass furnishes the only supply. No creeks or ponds occur, but water is found at an average depth of thirty feet by digging. No water-powers exist in this township. The township is located at about the extreme edge of the country, visited by chinook winds, the average rainfall, it is claimed by near residents, is greater than at Moosejaw, and the average winter temperature also slightly higher. There is no fuel available in the township, but proximity to the railway ensures a coal supply. There are no stone quarries. There are no minerals. Antelope is the sole representative of game. The soil, climate and grasses give every indication of agricultural possibilities. The township is first-class in every respect.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 13.

Township 27.—At the present time land-seekers and settlers, coming into this and adjoining townships, mostly make use of the trail from Saskatoon, but I am informed that a few came in by way of Hanley station on the Regina and Prince Albert branch of the Canadian Pacific railway, crossing the south branch of Saskatchewan river by ferry due west of Hanley. The Saskatoon trail is in good shape this year on account of the light snowfall last winter. The soil is chiefly either a clay or sandy loam overlying clay subsoil and is eminently adapted for grain growing. The surface throughout is rolling prairie with no timber whatever. The prairie grass is very short and thin and there are no hay marshes. There are two small lakes in the southeasterly part of the township, both of which are very alkaline. There is no running water in the creeks emptying into and flowing from these lakes. There is very little water in the sloughs. Very chilly wet weather occurred towards the end of the month of June, but no frosts were experienced, although there were frosts a short time previous. There is no fuel whatever in the township, but a limited supply of poplar can be obtained at Red Deer lake to the east. No coal was seen. No stone quarries nor minerals occur. There are a few antelope and some ducks were seen on the lakes but were not numerous. *H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 13.

Township 28.—At the present time land-seekers and settlers, coming into this and adjoining townships mostly make use of the trail from Saskatoon, but I am informed that a few came in by way of Hanley station on the Regina and Prince Albert branch of the Canadian Pacific railway crossing the south branch of Saskatchewan river by ferry, due west of Hanley. The Saskatoon trail is in good shape this year, on account of the light snow fall last winter. The soil is chiefly a dark strong clay, an excellent wheat soil. The surface throughout is rolling prairie with no timber or bush what-

SESSIONAL PAPER No. 25b

ever. The prairie grass is short and thin. There are no hay marshes. With the exception of a shallow slough, in section 33, no water was seen in the township. The water in the slough was sweet and evidently only gathered from the recent rains. In the last of June and the beginning of July the days were very hot and the nights usually cloudy. No frosts occurred. No fuel, stone quarries nor minerals were found. Numerous antelope were seen but ducks were very scarce. —*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 27.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford, and thence westerly into the township. The soil of the whole of this township is clay. Parts of sections 34, 35 and 36 are taken up by a portion of Bad lake, and around the lake the soil is alkaline clay. The greater part of the township is open rolling prairie. There is no timber. The growth of grass is fairly good and would be suitable for grazing, but there are no hay marshes. The water of Bad lake is very saline and disagreeable, but there is a stream of good water running across the north boundary of section 22 which is fed by springs in this section, and is permanent, and would furnish a limited supply of good water. There are one or two small sloughs in the western half of the township, but in very dry seasons these could not be relied upon. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins nor minerals of any kind were found. Ducks and geese were plentiful on Bad lake, and many antelope were seen—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 28.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford, and thence westerly into the township. The soil throughout the township is heavy clay. The north and westerly sides of the township are much broken up with deep rough coulees, but the greater part of the township is rolling prairie. Bad lake occupies most of sections 1, 2, 3, 10, 11, 12, 13, 14 and 15. The growth of grass is sparse, and there are no hay marshes. Parts of the township would be suitable for grazing. Bad lake is shallow and alkaline, and the water therefrom is not fit for use. There are some good springs, however, on sections 2, 4, 12 and 16, the water from which runs into Bad lake, and these would be a permanent source of supply in what is otherwise a very dry township. There is a pond of good water on the east boundary of section 35 and a small slough on the east boundary of section 30, but these would not be permanent in very dry weather. The general indications point to a climate with comparatively little rainfall in the summer months. There are no summer frosts. There is no supply of fuel in this township, nor coal nor lignite veins. No stone quarries nor minerals of any kind were found. Ducks and geese were very numerous on Bad lake, and several antelope were seen.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 29.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford and thence westerly to this township. The trail is in good condition. The soil is generally about six to eight inches of black loam on a clay subsoil. The township is hilly throughout, and best adapted to grazing, but some of the sections on the east side are not so hilly, and would be fairly suitable for

6-7 EDWARD VII., A. 1907

farming. The whole of this township is open prairie. There is no timber. There are numerous small hay marshes throughout the township, and larger ones in sections 6, 10, 31, 33 and 34, from which hay of good quality may be cut. Fresh water marshes and ponds are numerous throughout the township. The water supply is sufficient and permanent, and the land is not liable to be flooded. There are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township, nor coal nor lignite veins. There were no stone quarries nor minerals of any kind. A good many antelope were seen also ducks. An old cart trail crosses section 31, leading northeasterly, and joining the Battleford trail at the crossing of Eagle creek—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 31.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford as far as the crossing of Eagle creek. The trail is in good condition. From the crossing of Eagle creek, on the south side, there is a faint trail leading westerly along the creek about two miles, and thence south-westerly up the side of the valley to this township. The soil is generally about six inches of black loam on a clay subsoil and would be suitable for grazing. The township is open prairie, except for a few coulées that have a limited amount of poplar, and maple and some scrub in them. These coulées are on the north side of a high range of hills known as the 'Bad hills,' which enter the township in section 13, and run northwesterly, crossing the west boundary in sections 30 and 31. The north side of this range of hills is very rough and steep. The highest point of the range is in section 29, and, the descent to Eagle creek, about six hundred feet below, is very rapid. The north boundaries of sections 22 and 23 are along the slope on the north side of the Bad hills and cross a succession of deep ravines. There is a limited supply of poplar and maple timber from four to eight inches in diameter in these coulées at different points along the north side of the Bad hills. There is a fair growth of grass south of the Bad hills. Small hay marshes are numerous from which a limited quantity of good hay can be cut. Eagle creek flows through the northeast corner of this township, but its water is saline and disagreeable. South of the Bad hills water may be obtained in the ponds and marshes. No land is liable to be flooded and there are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. The coulées on the north side of the Bad hills will furnish a limited supply of fuel. No coal or lignite veins, stone quarries nor minerals of any kind were found. A few antelope were seen, also ducks on Eagle creek, and on the small ponds and marshes.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 32.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford until abreast of it, and thence westerly into the township; this trail is a very good one. Opuntia lake occupies part of sections 30 and 31 of this township, and from it flows Eagle creek across the township in a south-easterly direction through sections 30, 19, 20, 17, 9, 4 and 3. The soil generally throughout the township is clay, and for a considerable distance on either side of Eagle creek it is alkaline clay. The township is fairly suitable for grazing. The whole of the township is open prairie. There is no timber. The growth of grass is sparse, and there are no hay marshes. Eagle creek and Opuntia lake afford a supply of water that horses will drink, but it is saline, and disagreeable. Good water is very

SESSIONAL PAPER No. 25b

scarce indeed in this township. There are no sloughs, but a nearly dry creek-bed, running across the township, has a few pools which furnish a very limited supply of not very good water. After a succession of dry seasons there would be no water at all. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins, stone quarries nor minerals of any kind were found in this township. Many ducks and geese were seen on Opuntia lake.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 33.—The route for reaching this township is along the surveyed trail from Swift Current to Battleford until opposite the township, then westerly until this township is reached. Along the northern boundary of the township there is a fair depth of black and sandy loam, but the balance of the township is clay. The land is suitable for grazing. The whole of the township is open prairie. A portion of the southwest quarter of section 6 is cut off by Opuntia lake. There is no timber. The township has a fair growth of grass, and there is a large hay marsh in section 19 which would furnish a limited supply of good hay. Opuntia lake in the southwest corner of the township furnishes a supply of water for stock, although alkaline. Fresh water may be obtained from ponds on the east boundary of section 28, on the east boundary of section 26, and from two small sloughs near the centre of the township, also from the hay marsh in section 19, but in a dry season would be very scarce. No land is liable to be flooded. There are no water-powers. The general indications point to a climate with a fair rainfall. There is no fuel whatever. No coal or lignite veins, stone quarries nor minerals of any kind were found in this township. A few ducks and antelope were seen.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 18.

Township 34.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford, and thence westerly along a good cart trail which crosses the surveyed trail in township 35, range 16, west of the third meridian, at what is known as the 'sixty mile bush.' The cart trail crosses this township near the north boundary. In the northern part of the township there is a fair depth of sandy loam, changing gradually to sand at the south. The land is suitable for grazing. The whole of the township is open prairie. The southerly part has in places a scattered growth of wolf willow scrub, and rose bushes. There is no timber. The township has a fair growth of grass and a few small hay marshes in the southerly part. Lake Togo, in sections 15, 22 and 23, and Lake Oku, in section 23, furnish a permanent supply of water for stock, although alkaline. Fresh water may be obtained from a pond at the northeast corner of section 34 also from a number of smaller ponds and marshes throughout the township. No land is liable to be flooded, and there are no water-powers. The general indications point to a climate with a fair rainfall. There were no summer frosts. There is no fuel whatever in this township. No coal or lignite veins were found. There were no stone quarries nor minerals of any kind found in this township. A few ducks were seen around lakes Togo and Oku.—*Herbert J. Bowman D.L.S., 1904.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19.

Township 27.—A good trail from Swift Current to Battleford affords an easy access to this township. The soil is red clay with stones in places and is suitable for grazing. The surface is prairie with no timber of any kind. There is considerable hay in numerous hay marshes spread over the township. The water in the sloughs is generally fresh, but the quantity is insufficient as most of the hay sloughs dry up in the summer. There are no streams. The climate is dry and otherwise similar to that of Swift Current. Wood is obtainable for fuel at Saskatchewan river. There are no coal or lignite veins in the township. There are no stone quarries nor economic minerals as far as I observed. Antelope, duck, geese and chicken were seen in the township.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19.

Township 28.—A good trail from Swift Current to Battleford passes through range 17 and renders the township easy of access. The soil is generally a good clay loam, and with sufficient rainfall would be good for grain raising. The surface is prairie, with no timber, as far as I know, closer than South Saskatchewan river. The township has a number of hay marshes, comprising in all, probably 1,000 acres. The hay is ordinary marsh grass. The water in the lake is alkaline, but in the sloughs it is fresh. The supply is permanent in some of the sloughs, but its sufficiency is doubtful. There are no streams. No danger of floods and no chance of water-power. The climate is similar to that of Swift Current. Could not say anything as to summer frosts. Wood can be obtained along Saskatchewan river, a distance of about twenty-five miles away. I saw no coal or lignite veins, no stone quarries nor any minerals of economic value. Antelope, duck and geese were seen in the township.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19.

Township 32.—The route for reaching this township would be along the surveyed trail from Swift Current towards Battleford leaving it about opposite the centre of township 30, range 17, and thence northwesterly across township 30, range 18 and township 31, range 19. If coming from the north the trail would be left about opposite the centre of the township, and a course taken due west across country. This would necessitate crossing Eagle creek a short distance south of Opuntia lake. A crossing can be made if the wagons are light, and the loads are carried across. The whole of this township is clay with the exception of some sandy land forming parts of sections 24, 25, 26, 35, 36 on the west of Opuntia lake, which cuts off a small part of the northeast corner of this township. The land would be suitable for grazing, and the clay land for farming, as it is thought that when the soil is tilled it would tend to increase the rainfall. The whole of the township is open prairie. There is no timber. The growth of grass on this township is sparse, and there are no hay marshes. Opuntia lake enters sections 24, 25 and 36, and affords a supply of water, but it is saline and disagreeable, although horses will drink it. On the bank of the lake, in section 25, there is a fine spring of good water, but apart from this there is no permanent supply of good water in this township. The land is not liable to be flooded and there are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal nor lignite veins were found. There were no stone quarries nor minerals of any kind found in this township. Ducks and geese were numerous on Opuntia lake.—*Herbert J. Bowman, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19.

Township 33.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford and thence westerly along a good cart trail, which crosses the surveyed trail, in township 35, range 16, west of the third meridian, at what is known as the 'sixty-mile bush.' This cart trail would be followed as far as section 34, township 34, range 19, and then the route would be direct south to this township. Eagle creek and its expansion, Opuntia lake, divide this township into eastern and western parts. The soil of the eastern part is generally of a heavy clay, except along the lake and creek, the banks of which are in some places sandy and stony. The western part of the township has generally from four to eight inches of black loam on a sandy subsoil in the south, changing gradually to clay in the north. The valley of Eagle creek is nearly a mile wide, and is alkaline clay. This township is fairly suitable for grazing. The whole township is open prairie. There is no timber. The growth of grass on this township is sparse, and there are only a few small hay marshes. Eagle creek and Opuntia lake afford a supply of water that horses will drink, but it is saline, and disagreeable. On the bank of the lake, in section 2, there is a fine spring of good water which will afford a permanent supply. Water may also be obtained from the few small marshes in the northerly half of the township, but these will not be permanent after a succession of dry seasons. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins were found. There were no stone quarries or minerals of any kind found in the township. Ducks and geese were numerous on Opuntia lake.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19.

Township 34.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford, and thence westerly along a good cart trail which crosses the surveyed trail in township 35, range 16, west of third meridian, at what is known as the 'sixty-mile bush.' The cart trail crosses sections 33, 34, 35 and 36 of this township. Eagle creek crosses the southwest corner of this township in an alkaline valley nearly a mile wide. The balance of the township generally has a fair depth of black loam on a clay subsoil, and is covered with a rich growth of grass. This land is very fertile, and suitable for mixed farming, except in sections 23, 24, 25, 26, 35 and 36, which are hilly and better adapted for grazing. The whole of the township is open prairie, but it is broken by the escarpment of the 'Bear hills' along the south boundary. The valley of Eagle creek forms a pass through this range in which is located the proposed line of the Grand Trunk Pacific railway. The south side of the escarpment is broken by a number of coulées. In some of these poplar wood is found, and a little maple on east boundaries of section 2 and 9. The trees have a maximum diameter of six to eight inches, but there is only a limited supply. There are a number of small hay marshes scattered over the township, and particularly on sections 10, 21, 22, 28 and 29, but the quantity of hay that could be cut from these would be small. There is, however, as before mentioned, a rich growth of grass over most of the township, which could be cut for hay. Eagle creek flows through the southwest corner of this township and is about twenty feet wide and from one to three feet deep, but in a dry season there is scarcely any flow, and the water is not good. Good water may generally be obtained in the marshes throughout the township, and there are permanent ponds in sections 31, 33 and 34. Along the south side of the escarpment of the 'Bear hills' there are a number of springs of good water, a small creek from one of these crossing the south boundary of section 2 near the centre. The valley of Eagle

6-7 EDWARD VII., A. 1907

creek will be flooded in the spring to a depth of from one to two feet. There are no water-powers. The general indications point to a climate suitable for agriculture with sufficient rainfall to produce good crops. There were no summer frosts. A small quantity of poplar, and maple wood is available from the coulées before mentioned, but would soon be exhausted. When the land is taken up, and prairie fires put an end to, there are indications that bluffs of poplar would grow rapidly everywhere, and would possibly furnish a supply of fuel in time. No coal or lignite veins were found. There were no stone quarries nor minerals of any kind found in this township. A few antelope were seen, also a few ducks on Eagle creek and small ponds.—*Herbert J. Bowman, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 20.

Township 27.—A good trail from Swift Current to Battleford passes about five miles east of the township and renders it easy of access. The soil is clay for the greater part with stony ridges in places. It is suitable for grazing, but if irrigated, the greater part would do for grain growing. The surface is prairie with no scrub or timber of any kind. Small hay sloughs are found dotted over the township. There is no water except in one small slough in section 13. This water was fresh. The climate is apparently too dry, at time of our survey the ground was suffering for the want of moisture and at this season frosts were frequent (November), but cannot say as to summer frosts. There is no fuel in the township but it has to be hauled from the South Saskatchewan. There are no coal or lignite veins, no stone quarries nor economic minerals. Antelope was the only game seen.—*C. C. Fairchild, D.L.S. 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 20

Township 28.—A good trail from Swift Current to Battleford gives easy access to this township. The surface is bare prairie with a clay soil. There is no timber of any kind and wood has to be hauled from the South Saskatchewan river or Eaglehill creek. There are numerous small hay sloughs in the township. There are a number of sloughs in the township in the north part of which some seem to be fed with springs. The water is fresh and abundant, especially for this section of the country. There are no streams. The climate is dry, but I know nothing of the danger from summer frosts. Wood is the only fuel available and may be obtained from drift wood along the South Saskatchewan. There are no coal or lignite veins, no stone quarries nor economic minerals as far as I observed. Antelope, duck, geese and prairie chicken were seen.—*C. C. Fairchild, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 26.

Township 32.—There is a good trail from Medicine Hat to Battleford, via Red Deer Forks, which passes through township 31, range 24, from which a route can be found through township 31, range 25, thence to this township. The soil is mostly a very hard, stiff clay, the balance being a hard sandy loam with clay subsoil and is most suitable for a summer range for cattle, and not adapted for agricultural purposes. The surface is rolling prairie without any timber or trees of any kind. There are no streams, quarries, minerals, nor good hay marshes in this township. There are no large bodies of water but a number of grassy sloughs, the water in which is slightly alkaline.—*Walter Beatty, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 29.

Township 3.—From the town of Maple Creek the trail to Havre, Montana, was taken. About fifty-five miles out from Maple Creek the above-mentioned township was reached. The soil is generally third-class, being hardpan and gravel. The township consists of gently rolling country and numerous flats of cacti and sage brush. No commercial timber occurs. Very little hay is to be found. Lodge creek, the only water, is good and fresh, is about twenty links wide and two deep, and runs from two to three miles an hour. No water-powers are available. The climate is very similar to the average Southern Alberta climate with plenty of rain and summer frosts. Fuel is entirely absent, but wood can be had in Cypress hills. No rock in situ suitable for building purposes was observed. There are no indications of minerals. Antelope appear to be numerous; there are also a few ducks, chickens and geese.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 29.

Township 4.—From the town of Maple Creek the trail to Havre, Montana, was taken. About forty-seven miles out from Maple Creek the trail passes south through the above-mentioned township. The soil is generally third-class, being hardpan and gravel. The country is rolling and there is very good grazing. No commercial timber occurs. Very little hay can be cut on account of the grass being short; but what little can be had is very good. Lodge creek runs through this township. It is good, fresh water about twenty links wide and two deep, and runs from two to three miles an hour. No water-powers are available. The climate is similar to average southern Alberta climate, with plenty of rain and very often summer frosts. Fuel is entirely absent, but wood can be had in the Cypress hills thirty miles north. No rock in situ suitable for building purposes was observed. There are no indications of minerals. Antelope appear to be numerous. There are also a few ducks, chickens and geese.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 30.

Township 3.—From the town of Maple Creek the trail to Havre, Montana, was taken. Fifty or sixty miles out from Maple Creek the above-mentioned township was reached. The soil is generally third-class, being hardpan and gravel. The country is flat with cacti and sage brush. No commercial timber occurs. Very little hay can be found to cut. No water can be found. No water-powers are available. The climate is similar to average southern Alberta climate, plenty of rain and summer frosts. Fuel is entirely absent but wood can be had in the Cypress hills. No rock in situ suitable for building was found. There are no indications of minerals. Antelope appear to be numerous; feathered game are not so plentiful.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 30.

Township 4.—From the town of Maple Creek the trail to Havre, Montana, was taken. Fifty or sixty miles out from Maple Creek the trail passes through the above-mentioned township. The soil is generally third-class, being hardpan and gravel. The surface is rolling and open. No commercial timber occurs. Very little hay can be cut on account of the grass being short; but what little can be had is very good.

6-7 EDWARD VII., A. 1907

The only water in the township is Lodge creek, which is good fresh water. No water-powers are available. The climate is very similar to the average southern Alberta climate with plenty of rain and summer frosts. Fuel is entirely absent but wood can be had in the Cypress hills. No rock in situ suitable for building purposes was observed. There are no indications of minerals. Antelope appear to be numerous ; there are also a few ducks, chickens and geese.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 27.—This township may be reached by taking the Battleford and Medicine Hat trail from either place and leaving it in township 26, thence northwesterly across a rolling prairie country which can be traversed in almost any direction. The township is fairly level open prairie. The soil in the northern part is mostly sandy, and in the southern and central part chiefly clay and in many places hard. The water in most of the sloughs is alkaline, but sufficient fresh water was found in some of the shallow sloughs for camping purposes. There are no minerals, quarries nor water-powers in the township. Duck was the only game seen. The township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, and leaving it in township 26, thence northwesterly over a rolling prairie country which can be traversed in almost any direction. The northern half of the township is rolling and hilly, while the southern half is fairly level and is all open prairie. The soil is mostly clay and in places hard, requiring a pick to dig the pits. The water is mostly alkaline, but there is fresh water in some of the shallow sloughs. There are no minerals, quarries nor water-powers. Ducks and a few antelope were the only game seen. The township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 29.—This township may be reached by way of the Battleford and Medicine Hat trail from either place, and leaving it in township 26, thence northwesterly over a rolling prairie country which can be traversed in almost any direction. This township is more hilly than rolling, the hills ranging from thirty to seventy-five feet high. It is all open prairie. The soil is generally light and sandy, but stiff or hard clay occurs in places, so that it was often necessary to use the pick-axe to dig the pits. The water in the sloughs is mostly alkaline, but sufficient fresh water was found for camping purposes. There are no minerals, quarries nor water-powers. Duck was the only game seen. This township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place to a point opposite the township, thence west over a rolling prairie which can be traversed in almost any direction. The township is rolling and hilly, the hills ranging from forty to seventy-five feet high. The township is all

SESSIONAL PAPER No. 25b

open prairie and mostly of a light sandy soil, but occasionally clay occurs. The water is all strongly alkaline. There are no minerals, quarries nor water-powers in the township. The only game seen were duck and antelope. The township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 31.—This township may be reached by taking the Battleford and Medicine Hat trail from either place and leaving it in township 26, then striking northwest over a rolling prairie country. The township is more hilly than rolling, being broken by many hills, ranging from twenty-five to seventy-five feet high. It is all open prairie and the soil is mostly sandy but clay also in some places. There are numerous lakes, some of considerable size, but the water is all tainted with alkali, although lake No. 7 has two springs of fresh water flowing into it, the water in it is strongly alkaline as well as lake No. 3, which has one spring flowing into it. There are no minerals, quarries nor water-powers. Ducks and antelope were quite plentiful. This township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 32.—This township may be reached by taking the Battleford and Medicine Hat trail from either place to a point opposite the township, thence west over a rolling prairie country which can be crossed in almost any direction. The two southerly tiers of sections are quite hilly, the hills ranging from forty to seventy-five feet high. The northerly portion is rolling, but there are no high hills. The township is all open prairie with light sandy soil and gravel in places. The water in the lakes is strongly alkaline. There are no minerals, quarries nor water-powers. The township is more suitable for grazing than for agricultural purposes.—*David Beatty, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 49.—A great part of the township is good farming land, the soil being a black loam with clay subsoil. About one-half of the area is covered with willow and poplar brush. There is no large timber. The water in most of the sloughs is fresh. I saw no indications of minerals. Lloydminster, a village situate in the southern part of the township immediately to the north, is the market for that section of country.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 50.—This township has settlers scattered throughout it, many of them with considerable improvements. Part of the village of Lloydminster is on section 1 of the township. The greater part of the village is on the east side of the fourth meridian in the province of Saskatchewan. Lloydminster has a population of about five hundred, and many new buildings have been started since the railroad reached the place in August. The Canadian Northern railway crosses sections 1, 2, 3, 4, 5 and 6. About one-half or more of the surface of this township is covered with brush in small patches. Where poplar brush had apparently been destroyed by fire, willow brush has grown up. The soil is generally good and well suited for farming purposes. The water is fresh in most of the sloughs. No indications of minerals were observed.—*David Beatty, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 51.—There are only a few actual settlers in this township who have located by building, but there are many indications of locations by patches of ploughing. The face of the country is generally rolling and about two-thirds of the area is covered with willow and poplar brush in patches. As in other townships where poplar brush has been destroyed by fire, willow brush has grown up. A deep ravine crosses from west to east through the northern tier of sections, with a creek-bed which was found in many places to be dry. The greater part of this township is good land and well suited for farming purposes, but that lying north of the ravine is light soil. The water is generally fresh. No indications of minerals were noticed.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 52.—There are no settlers in this township, although the greater part of it is fairly good farming land. The surface is generally rolling and resembles the adjoining townships as to brush, which is principally willow and covers about two-thirds of the area; where poplar brush has been destroyed by fire, willow brush has grown up. The water is generally fresh in the sloughs but the water in the lakes in the northern part of the township is alkaline. I saw no indications of minerals.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 53.—There are no settlers in this township, and it is more suitable for grazing than for grain growing. The northern portion lying along or near Saskatchewan river is very hilly, and the soil is light, with considerable poplar brush, only fit for fuel or fence poles. About three-fourths of the area of this township is covered with bush or brush. The water in most of the sloughs is fresh. No indications of minerals were seen.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 27.—Various trails from the mouth of Red Deer river and from Steerford on Red Deer river, all of which come from Medicine Hat, on the Canadian Pacific railway, and some of which run through to different stations on the Calgary and Edmonton railway, pass south of this township. The surface is entirely high, rolling prairie, altogether destitute of timber. The soil is very poor, mostly third-class, being a mixture of sand, clay and gravel, and being very stony in places, thus making a very poor farming country. Prairie grass is short and thin and there are no hay marshes. Very little hay can be cut around the few sloughs, the soil being too alkaline for growing good grass. There is no running water. There are numerous small alkaline lakes, but fresh water is very scarce. No water-powers occur. The climate in July was very hot with no indications of frosts at night. No fuel was found nearer than Red Deer river, there being a limited supply of timber in that valley. No stone quarries nor minerals occur. No game of any kind was seen.—*H. B. Proudfoot, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 28.—Various trails from the mouth of Red Deer river and from Steerford, on Red Deer river, all of which come from Medicine Hat, on the Canadian Pacific railway, and some of which run through to different stations on the Calgary and Edmonton railway, pass south of this township. The soil is mostly light clay and sandy loam, stony in places and much too light for grain growing. The surface is entirely prairie, rolling but inclined to be hilly in some parts. There is no timber whatever. The prairie grass is short and thin and although hay may be cut in limited quantities around most of the sloughs, no hay marshes of any extent were found. There are a large number of alkaline sloughs, but very little fresh water in the township. There are no water-powers. The climate seems to be about the same as in other parts of the west, the days being hot, when there is no wind, and the nights cool; in July, the temperature falling very near the freezing point on the night of the 12th. No fuel occurs closer than South Saskatchewan river. No coal nor stone quarries occur. No minerals were found. Game was very scarce, only a few antelope and ducks being seen.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 29.—Various trails from the mouth of Red Deer river and from Steerford, on Red Deer river, all of which come from Medicine Hat, on the Canadian Pacific railway, and some of which run through to different stations on the Calgary and Edmonton railway, pass to the south of this township. The surface is entirely prairie, rolling but inclined to be hilly in some parts. There is no timber whatever. The soil is light clay and sandy loam, very stony towards the east and altogether too light for grain growing. The prairie grass is short and thin, and although hay can be cut in limited quantities around most of the sloughs no large hay marshes were met with. There are quite a number of sloughs of alkaline water, but fresh water is very scarce. No water-powers occur. The climate seems to be about the same as in other parts of the west, the days being hot, when there is no wind, and the nights cool in July, the temperature falling to near the freezing point on the night of the 12th. No fuel was found closer than South Saskatchewan river. No stone quarries nor minerals occur. Game of all kinds seemed very scarce, although a few antelope and ducks were seen.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 30.—A new trail, made recently by settlers going into the Sounding Lake district, and connecting with the old trail for Medicine Hat at Steerford, on Red Deer river, where there is a ferry, passes through township 30, range 3, affording an easy route to reach this township. This trail is rough at present as there has not been much traffic over it, and until the valley of Sounding creek is reached there is very little water. The soil is principally clay, very hard in most places, and is not adapted for agricultural pursuits. The surface is all prairie, rolling to hilly. There is no timber. A limited quantity of hay can be cut around what sloughs there are, but no large hay marshes were seen. The prairie grass is short and thin. There is no running water in the township and most of the sloughs and ponds are very alkaline. A slight frost occurred on the night of August 15th, the first since June. The weather was hot and dry, only a few local showers occurring. There is no fuel nearer than Red Deer river and only a limited quantity there. No coal or lignite was discovered. No minerals nor stone quarries occur. A few antelope and duck were seen.—*H. B. Proudfoot, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 31.—The township is easily reached by a trail either from Medicine Hat or Battleford. The surface of the township is rolling, except the southern part which, however, is hilly. In the northeasterly part there are a number of sand hills. The soil generally is fourth-class, being either sand, or very hard clay. Water is not plentiful, there being only three or four fresh water sloughs in the whole township. There are a few salt sloughs, and one saline lake of considerable size on section 5. The township is destitute of timber, minerals, water-powers and stone quarries. This township might do for grazing purposes, but the surface is very dry and the grass does not attain to much perfection.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 32.—This township is generally level prairie, and the soil clay and sand. A trail from Medicine Hat to Battleford passes through the township. Sounding creek, a sluggish saline stream, runs through the westerly part of the township, and extensive hay meadows occupy the northwesterly part. The water throughout the township is saline. No wood, stone quarries nor minerals occur. There are a few beds of clay which might be suitable for the manufacture of clay products. This township is only adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 49.—There were only two settlers in this township at the time of survey, although indications of several locations were indicated by small patches of ploughing. The western and southern part of the township is very rough and rolling and the soil generally light, and in many places stony. About one-third of the area of the township is covered with brush, principally poplar, in the southern part. The water is fresh in most of the sloughs. No indications of minerals were observed.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 50.—There are several settlers in this township but none with large improvements. The soil is generally good and well suited for agricultural purposes. The Canadian Northern railway passes across the northern part of the township. The surface is generally rolling and about two-thirds of it is covered with willow and poplar brush. As in other townships where the poplar brush has been destroyed by fire, willow brush has grown up. There is very little timber large enough for building purposes, but plenty suitable for fencing and fuel. The water is generally good in the sloughs. No indications of minerals were noticed.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 51.—No settlers were found in this township, although there were indications of such from small patches of ploughing in several places. The township is well suited for agricultural purposes. The water in most of the sloughs is fresh. About one-half of the area is covered by willow and poplar brush, prairie and brush alternating in small patches. There is not much timber fit for building purposes but

SESSIONAL PAPER No. 25b

sufficient for fencing and fuel. No indications of minerals were noticed.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 52.—There are several settlers in this township but none with large improvements. The soil is generally good and well suited for agricultural purposes. Fresh water is found in most of the sloughs. Fully one-half the area is covered with willow and poplar brush. There is no large timber in the township and no indications of minerals.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 2.

Township 53.—The soil throughout the township is generally light and I consider better adapted to grazing than grain growing. The water is fresh in most of the sloughs. I found no indications of minerals.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 27.—A new trail, made by recent settlers going into the Sounding lake district and connecting with the old trail for Medicine Hat at Steerford, where there is a ferry crossing Red Deer river, passes through range 4. This trail is rough at present as there has not been much traffic over it. The soil is principally clay and gravel, very stony and very hard and not of much account for agricultural pursuits. The surface is all high, rolling prairie entirely destitute of timber. A limited quantity of hay can be cut around most of the alkaline sloughs. There are no large hay marshes and the prairie grass is very short and thin. There is no fresh water in the township. Some of the sloughs are very alkaline, the salt being crystallized on the surface to the depth of several inches. A few of the sloughs contain water that can be used for drinking and cooking purposes. The weather at the end of July was very warm and some days were extremely hot. Numerous thunder storms were seen passing, mostly to the south along Red Deer river, but no rain to amount to anything fell in our vicinity. No wood occurs nearer than Red Deer river, and only a small amount there. No coal, nor stone quarries nor minerals occur. A few antelope and ducks were seen and one lonely prairie chicken.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 28.—A new trail, made by recent settlers going into the country surrounding Sounding lake and connecting with the old trail for Medicine Hat at Steerford, where there is a ferry crossing, Red Deer river, passes through range 4. This trail is rough at present as there has not been much traffic over it. The soil is principally clay and gravel, very stony and very hard and not of much account for agricultural pursuits. The surface is all high rolling prairie with no timber whatever. A limited quantity of hay can be cut around most of the sloughs, which are mostly dry this season. There are no hay marshes of large area and the prairie grass is short and thin. There is very little fresh water in the township. Some of the sloughs are very alkaline, the salt being crystallized on the surface to the depth of several inches. A few of the sloughs contain water that can be used for drinking and cooking purposes. The weather at the end of July was very dry and warm, some days being ex-

6-7 EDWARD VII., A. 1907

tremely hot. Numerous thunder storms were seen passing, generally to the south along Red Deer valley, but no rain to amount to anything fell in our vicinity. No fuel occurs nearer than Red Deer river and only a small amount there. No coal, stone quarries nor minerals occur. A few antelope and duck were seen.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 29.—A new trail, made by recent settlers going into the country, surrounding Sounding lake and connecting with the old trail for Medicine Hat at Steerford, where there is a ferry crossing, Red Deer river, passes through range 4. This trail is rough at present as there has not been much traffic over it. The soil is principally clay and gravel, very stony and very hard, and not of much account for agricultural purposes. The surface is all rolling or high rolling prairie with no timber whatever. Hay can be cut around and through the numerous dry sloughs. There are no large hay marshes, and prairie grass is short and thin. On account of the intense heat during the last week in July the grass that was green at the beginning of the week was yellow at the end. Fresh water is more plentiful in this township than in those to the south of it, there being several springs around Lake No. 2 and quite a few fresh water sloughs. There is no running water. The weather in the beginning of August was exceedingly dry, the days being very hot. No rain, to amount to anything, fell for more than a month. I am informed that there is a little small timber a short distance north, but not enough to be called fuel. No coal nor lignite was found. No stone quarries nor minerals were discovered. A few antelope and ducks were seen and also small flocks of geese were noticed flying.—*H. B. Proudfoot, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 30.—A new trail made by recent settlers going into the country surrounding Sounding lake and connecting with the old trail for Medicine Hat at Steerford, where there is a ferry crossing, Red Deer river, passes through this township. This trail is rough at present as there has not been much traffic over it. The soil is principally clay and gravel, very stony and very hard, and not of much account for agricultural pursuits. The whole surface is prairie, rolling, but becoming hilly to the east and northeast. I was informed that there is timber in the northeast part of the township, but on investigation it proved to be only small stuff in a few ravines. No coal nor lignite was discovered and the nearest timber is in Red Deer valley, where the supply is limited. Hay can be cut around and through the dry sloughs. There are no large hay marshes and the prairie grass is short and thin. Fresh water was found in a few sloughs, but is scarce. Sounding creek, nearly dry at present, flows easterly and northerly through the township. The bed is deep mud and the current slow. No water-power could be developed in it. The water is alkaline. The weather in the beginning of August was very hot. No stone quarries nor minerals occur. A few antelope and ducks were seen, and some small flocks of geese were noticed flying. There is no doubt that the fires in the spring caused the scarcity of ducks and chickens. Numerous burned nests were found and in the beginning of August broods of young ducks and chickens were seen which did not appear to be many days old.—*H. B. Proudfoot, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 31.—This township is rolling prairie, except in the south where it is hilly. It is easily reached by a trail from Medicine Hat to Battleford. The soil is generally clay or hard sand. Sounding creek, a sluggish saline stream, runs through the township in a northeasterly direction, and occupies a wide valley composed of extensive clay beds. There is no timber of any kind and the only fuel is the willow along Sounding creek. The water throughout the township is very bad. No stone quarries no minerals of any kind occur. The township is only suitable for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 32.—This township is rolling prairie, except in the south and west where it is hilly. The soil generally is sand and clay and is very hard and dry. Water is very scarce throughout the township. There is a small stream about the centre of the township which contains a few pools of good water. There is no timber. The only fuel is confined to a few willows in the valley of a small stream. Wild fruit, such as cherries, currents and gooseberries are plentiful in the hills. There are no water-powers, stone quarries nor minerals. Game is confined to a few jack-rabbits and an occasional antelope. This township is only suitable for grazing purposes, and is easily reached by a trail from Medicine Hat or Battleford.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 33.—This township is rolling prairie and the soil a very hard dry sand. Three lakes (expansions of Sounding creek) occupy a considerable part of the township. The water in these lakes is saline and not very pleasant to the taste. Sounding creek enters the township near the southeast corner and leaves it near the northwest corner. There is very little good water in this township and no timber nor fuel nearer than twenty miles. No water-powers, stone quarries nor minerals occur. Game, such as wild ducks and geese, appears to be very plentiful. The grass throughout the township is of very poor quality. There appears to be a great deal of wild fruit around the lakes. This township is hardly adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 52.—Six settlers were found located in this township, all with comfortable houses and stables. Vermilion river passes through the west side of the township through a valley about one mile wide and one hundred feet deep. This river is about one chain wide and of good fresh water. The soil is everywhere fairly good and adapted for agricultural purposes. There are many small hay marshes scattered throughout the township. There is not much building timber, although about one-half of the surface is covered with brush or small poplar. No indications of minerals were seen.—*David Beatty, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 3.

Township 53.—There are several settlers in this township, none of whom have been living on their places more than two years, consequently not many improvements have been made. The soil is generally good and well suited for farming purposes. Vermilion river passes through the western part of the township in a valley about one mile wide and one hundred feet deep. The river is about one chain wide and is fresh water, with swift current and some short rapids but no falls. The country is generally rolling and about one-half of the surface is covered with brush in patches alternating with prairie. There are many small hay swamps and the water in the sloughs is generally fresh. No indications of minerals were noticed.—*David Beatty, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 27.—This township is reached by trail from Medicine Hat, which trail being rough and hilly, water is very scarce along the route. The soil is from a sandy to light clay loam over clay, very stony in places, and with a reasonable amount of rainfall would be fit for small farming or stock raising. The surface is rolling prairie full of badger holes, very stony on the hill tops, with scattered stones all over the surface. There is no timber of any kind. There is no hay to speak of, in this township, except in a few small dried up sloughs, which produce a coarse grass. The high land grass is short and thin, but very nutritious. The only surface water seen was two small alkaline ponds, about 18 inches deep; one on the northwest quarter of section twenty-two, and northeast quarter of section twenty-one, the other on the northeast quarter of section sixteen. On the west side of the latter is good spring water, by digging three or four feet deep, also on the southwest quarter of section fifteen, and the southeast quarter of section nineteen. These springs, I think, will be permanent and sufficient for the sections named. There are no water-powers. The climate is very dry with high winds; and appears to have been so for a number of years, as all the streams and ponds shown on survey of outlines, are now all dry. The nearest fuel I know of is along Red Deer river, and in the Hand hills, thirty or forty miles distant, where I believe there is a supply of both wood and coal. There are no stone quarries nor minerals. Some antelope, a few prairie chickens and ducks were seen in this township. There are a number of dried up ponds throughout this township, the beds of which are covered with a white powder, or crystallized alkali, from which, on a windy day a white dust rises like snow in the winter.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 28.—This township is reached by trail from Medicine Hat, which trail is rough and hilly; water is very scarce along the route. The soil is sandy loam over clay, and with a reasonable amount of rainfall would be suitable for agriculture or ranching. The surface is rolling prairie, with considerable scattered surface stones, and some of the hill tops are very stony. There is no timber of any kind. Hay is very scarce in this township, only a few small dried up sloughs, producing a very coarse grass. The grass on the high land is short and thin, but very nutritious. There is no surface water. I got alkaline water at a depth of nine feet at the northwest corner of section eleven. There are no water-powers. The nearest fuel that I know of is along Red Deer river, or in the Hand hills, where I believe there is a supply of wood and coal. The climate is very dry and windy, appearing to have been so for some years, as the ponds and streams shown on the survey of outlines, are now all dried up. The first frost noticed was on the 1st of September. There are no stone

SESSIONAL PAPER No. 25b

quarries nor minerals. Only a few antelope were seen in this township.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 29.—This township is reached by trail from Medicine Hat; which trail is rough and hilly; water is very scarce along the route. The soil is a good sandy loam over clay, and with a reasonable rainfall would grow good crops, it would be suitable for agriculture or stock raising, but this season it has been far too dry. The surface is rolling prairie with some scattered surface stones. There is no timber. The only hay is a coarse grass found in the bottoms of dried up sloughs, of which there are a number scattered all over the township, but they are most numerous in the west half. There are no large hay meadows. There is no water, except a small alkaline pond on the southwest quarter of section 5. We got strongly alkaline water on the southwest quarter of section nine by digging ten feet in the bottom of a recently dried up slough. The climate is very dry and windy, and appears to have been so for a number of years, as all the ponds and streams shown on the survey of outlines, are now dried up. There was a heavy frost on the 1st of September. The nearest fuel that I know of is along Red Deer river, or in the Hand hills, forty or fifty miles distant, where there is a supply of wood and coal. There are no stone quarries nor minerals. There is no game, excepting a few antelope. There has been no rain to moisten the soil, since I came here on the 2nd of August, but we could see frequent thunder showers all around us during August and the first part of September.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 30.—This township is reached by trail from Medicine Hat. The soil is a sandy or clay loam, over clay, with considerable surface stones in places, being suitable for wheat growing or stock ranching, if there was a reasonable amount of rainfall. The surface is rolling broken prairie. There is no timber or scrub, excepting a few clumps of willows along the banks of Sounding creek. The surface in the northern two-thirds of the township is broken by three ravines or valleys, the banks of which are abrupt in places, and sloping in others; these traverse the township from west to east, where they join the valley of Sounding creek, which crosses about the middle of the township. This is dry, with the exception of a few water holes in its course, the water in some not being fit for use. The only hay to be found is in the bottom of a few small dried up sloughs scattered over the township. The grass on the high land, is very thin and short, being chiefly buffalo and spear grass. I found some fresh water in a few small holes in the water course shown on the north of sections twenty-seven and twenty-eight, water was also found in a hole on the south of section twenty-seven, and again on the south of section fifteen, but both are strongly alkaline, and not permanent or sufficient. The climate is very dry, with strong winds. There was a heavy frost on the 1st of September. The nearest fuel I know of is along Red Deer river, or in the Hand hills forty or fifty miles distant, where there is a supply of coal and wood. There are no stone quarries nor minerals. A few antelope were seen in this township. A wagon trail passes through the southeast corner of this township, from section four to section twelve.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 31.—This township is reached by trail from Medicine Hat, which is rough and hilly, water along the route being very scarce. The soil is clay and sandy

6-7 EDWARD VII., A. 1907

loam over clay, being suitable for wheat growing and ranching. The surface is rolling prairie. There is no scrub. A valley from thirty to seventy feet deep, runs across the southern part of the township, from west to east, through sections 7, 6, 5, 4, 3, 2, 11, 12, 14 and 13, in the bottom of which is the bed of a dried up creek. Another valley crosses the southeast corner of section one. The tops of the ridges are very stony and some stones are scattered all over the surface of the prairie. The only hay is in the bottom of dried up sloughs of which there are quite a number in the northern part of the township, and which produce a rank growth of grass. The grass on the high land is very short and thin, being mostly buffalo and spear grass. There was no water at the time of survey, except in a slough on the east boundary of section 33, and that was alkaline. The land is not liable to be flooded. The climate is very dry and windy, and appears to have been so for some years, as the creeks and ponds, show on the survey of outlines, are now all dried up. The nearest fuel that I know of is along Red Deer river, and in the Hand hills, some forty or fifty miles distant, where there is both wood and coal. There are no stone quarries nor minerals. A few antelope were seen in this township.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 32.—This township is reached from Medicine Hat by a trail which is rough and hilly, water being very scarce along the route. The soil, is a rich clay, or sandy loam, over clay, being suitable for wheat growing or ranching. The surface is rolling prairie in the south half and very rolling and hilly in the north half. Stones are scattered all over the township, the hill tops and ridges being very stony. There is no timber. The only hay is in dried up sloughs, and water courses, mostly in the southern part of the township and which produce a rank growth of grass. There is no water, except in a few sloughs, in the southwestern part of the township, and which will be all dry in a few weeks unless very heavy rains should come soon. The water in these sloughs is mostly alkaline. The supply is not sufficient or permanent. The land is not liable to be flooded. The climate is very dry and appears to have been so for the past few years; as the creeks and ponds show on the survey of outlines are now all dry. I saw no summer frosts. The nearest fuel I know of is along Red Deer river, or in the Hand hills, some forty or fifty miles distant, where I believe there is plenty of wood and coal. There are no coal nor lignite veins. There are no stone quarries, but plenty of loose surface stones. No minerals of economic value were found. The only game seen was antelope.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 33.—This township is generally rolling prairie, except in the southeast where it is hilly. Some peculiar hills of clay occupy part of sections 19 and 20. These hills are over one hundred feet high and are cut up by numerous steep banked ravines. The soil throughout the township is clay and sand with a few inches of black loam in places. There is no good water, the few sloughs being saline. No timber, water-powers, stone quarries nor minerals occur. Game is confined to an occasional jack-rabbit. This township is easily reached by a trail from Medicine Hat or Battleford and it is only adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 4.

Township 34.—This township is level prairie, except in the north part where it is rolling. The soil generally is clay and sand, but in some places there are a few inches

SESSIONAL PAPER No. 25b

of black loam. Sounding creek, a sluggish saline stream, enters the township on the east boundary in section 12, expands into a lake, flows northerly and leaves the township on the north boundary. The water throughout the township is alkaline. There are no water-powers, stone quarries nor minerals of any kind; neither are there any timber or willows. The grass is very short and does not attain to much perfection. The township is easily reached from Battleford or Medicine Hat by trail. The township is only adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 27.—This township is reached by trail from Medicine Hat, the trail is in good condition, but there is no water along the route between here and Steerford, on Red Deer river. From Steerford to Medicine Hat a distance of seventy miles, there are springs from fifteen to eighteen miles apart, but no settlements. The soil is a sandy or clay loam over clay. It is very stony and on this account is rated third-class, being only fit for grazing or small farming. There is no hay, except in a few small dried sloughs scattered over the township. The surface is rolling prairie in the southwest and hilly in the northeast, being stony with some large boulders. There is no timber of any kind. There is no surface water, but we found water by digging on the northwest quarter of section sixteen, finding plenty of alkaline water at a depth of five feet in a slough bottom. The climate is very dry and windy; the first frost was noticed on the first of September. There is no fuel; the nearest that I know of is along the banks of Red Deer river, or in the Hand hills some thirty or forty miles distant, where I believe there is a supply of coal and wood. There are no stone quarries nor minerals. Some antelope were seen, but no small game.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 28.—This township is reached by trail from Medicine Hat. The trail is in good condition, but water is very scarce along the route, there being no water between township 27, range 4, and Steerford on Red Deer river. The soil is a sandy loam or clay loam over clay, and fit for agriculture or stock raising. The surface is rolling prairie, with considerable scattered surface stones. There is no timber of any kind. There were a few very good hay sloughs scattered over the township, but a fire swept over this part of the country on the 5th instant, and has burned even the roots of the grass in the dried up sloughs. There is no water. I dug two wells but did not get sufficient water for the camp. The climate is very dry and windy. The first frosts noticed were on the first and third of September. There is no fuel; the nearest that I know of is along Red Deer river, and in the Hand hills, where I believe there is a supply of wood and coal. There are no stone quarries nor minerals. A few antelopes were seen.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 29.—This township is reached by trail from Medicine Hat. The trail is in fairly good condition, but water and fuel is very scarce along the route. There is no water between township 27, range 4, and Steerford post office (on Red Deer river), and the only wood is at the river. There are no settlers along the route. The soil is a sandy or clay loam over clay, and fit for agriculture or stock raising. The surface is rolling prairie, rather hilly in the southeast; there are some scattered surface stones, all over the township, the hill tops being very stony. There is no timber of any kind.

6-7 EDWARD VII., A. 1907

There are a few hay sloughs, most of them being in the northwestern part of the township. There is no surface water, but I found fresh water, at the depth of twelve feet, near the centre of section twenty-eight. The climate is very dry and windy, the first frosts noticed were on the first and third of September. The nearest fuel I know of is along Red Deer river, or in the Hand hills, where I believe there is a supply of both wood and coal. There are no quarries nor minerals. A few antelope were seen.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 30.—This township is reached by trail from Medicine Hat; the trail is in fair condition, but water and fuel is very scarce along the route, there being no water between township 27, range 4 and Red Deer river, and the only fuel to be had is at the river. There are no settlers along the route. The soil in this township is a sandy or clay loam over clay, being fit for agriculture or stock raising. The surface is rolling prairie, being rather hilly in the south and east, but more level north of Sounding creek. There are some scattered stones all over the surface of the township, most of the hill tops are very stony. There is no fuel of any kind, except a few willow clumps along Sounding creek. This creek flows in an easterly direction across the township, through sections 18, 19, 20, 28, 22, 23 and 24, being contained in a wide valley, the banks of which are sloping in places, in others quite abrupt. There was no water in the creek at the time of survey, except in a few holes, and that was very strongly alkaline. There are a number of grass sloughs in this township, more particularly to the north of the creek. There are no water-powers. The climate is dry and windy; the first frosts noticed were on the 1st and 3rd of September. There is no fuel. There are no stone quarries nor minerals. Antelope, some prairie chicken and rabbits were seen in Sounding creek valley.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 31.—This township is reached by trail from Medicine Hat, the trail is in fair condition, but water and fuel is scarce along the route, there being no water between township 27, range 4, and Steerford, on Red Deer river. The only fuel to be had is at the river. There are no settlers along the route. The soil is from sand to clay loam over clay, suitable for ranching. The surface is rolling prairie. There is no timber of any kind. There could be a large quantity of coarse slough hay made in a dry season. The sloughs are pretty evenly scattered all over this township. There were a few sloughs with water in them at the time of survey. The climate is dry and windy. There is no fuel. There are no minerals nor stone quarries. Antelope and duck were the only game seen.—*Hugh McGrandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 32.—This township is reached by trail from Medicine Hat. The trail is in good condition, but water along the route is very scarce. The soil is clay almost to the surface. The surface sod is mixed with a little gravel and there is very little loam of any kind over the clay except in low places and would be suitable for wheat growing or stock raising, but there is too much spear grass for sheep. The surface is prairie, undulating or slightly rolling in the west half with the exception of sections 32 and 33, which are in the Sharp hills. The southeast quarter is rolling prairie, the northeast quarter being very rolling and hilly. A range of hills known as the Sharp hills runs across this quarter in a northwesterly and southeasterly direction, the hill

SESSIONAL PAPER No. 25b

tops are as a rule very stony. There is no timber, except two or three small clumps of small poplars and willows, in a deep ravine on the northeast side of Sharp hills. There is considerable hay of a good quality in the bottoms of dried up sloughs scattered all over the townships. A spring was found on the northeast quarter of section thirty-four and a slough of good water on the northwest corner of section fourteen. There are no water-powers. The climate is very dry, the first frost noticed was on the 1st of September. The nearest fuel that I know of is the Hand hills or along Red Deer river some forty or fifty miles distant, where there is a supply of both wood and coal. There are no stone quarries nor minerals. A number of antelope were seen.—*Hugh Mc-Grandle, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 33.—This township is heavily rolling prairie throughout. The soil is clay and sand, but in most places a few inches of black loam covers the clay. The township is easily reached by a trail from Medicine Hat or Battleford. There is no timber of any kind; no water-powers, stone quarries or minerals occur. The water throughout the township, in the sloughs, is good. The grass attains to a good height and appears well adapted for pasture. There is not much game; a few antelope and occasionally a few jack-rabbits being seen. The township is well adapted for grazing.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 5.

Township 34.—This township is heavily rolling throughout. A small stream runs easterly through the northerly part which has a wide, deep valley with numerous ravines branching out in all directions, thus badly cutting up the township. The soil is generally clay and sand, covered by a few inches of black loam. There is quite a quantity of poplar in some of these ravines, suitable for fuel, but none of the timber is large enough for building purposes. The water throughout the township, in the sloughs, is fresh and good. The grass in the valleys attains a good growth. No water-powers, stone quarries nor minerals occur. Wild game, such as ducks, abound in the sloughs, and numerous bands of antelope were seen. The township is easily reached by trail from Battleford or Medicine Hat and is well adapted for ranching purposes. Small fruit, such as Saskatoon berries and gooseberries were plentiful in the ravines.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 6.

Township 32.—The route to reach this township is by the trail from Battleford going by Sounding lake. It is in good condition. The soil is hard blue clay with sand gravel and is stony. It is suitable for grazing purposes. The surface is rolling open prairie with no shrub nor timber of any kind. There are only a few small hay marshes which are of poor quality. The water is mostly alkaline with very little fresh. There is not a sufficient supply and it is not permanent. There are no water-powers of any kind. The climate is good and there are no summer frosts. There is no fuel. Wood can be procured at Red Deer river. There is no coal nor lignite veins in the township. No minerals occur. The game is mostly water fowl, and a few antelope.—*C. E. Le-moine, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 6.

Township 33.—This township is generally level prairie or slightly rolling. A small stream with a wide valley runs northeasterly through the township, while numerous ravines, radiating from the valley, cut up the northeasterly part of the township badly. The soil, generally, is clay and sand covered with a few inches of black loam in places. There is very little good water in the township and no timber. The grass is very short and not well adapted for pasturage. There are no stone quarries, water-powers nor minerals of any kind. The township is reached by a trail from Medicine Hat or Battleford and is fairly well adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 6.

Township 34.—This township is rolling prairie. The soil is clay and sand with from two to ten inches of black loam. A small stream with a wide valley runs through the southeast corner of the township. There are a number of ravines radiating from this valley, in some of which poplar and willow occur large enough for fuel but not for building purposes. The water throughout the township is generally good. The grass is strong and luxurious, and makes good pasture. There are no water-powers. No stone quarries, nor minerals of any kind occur. The township is easily reached from Battleford or Red Deer by trail and is well adapted for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 6.

Township 35.—This township is mostly rolling prairie, but in the northeast it becomes hilly. The soil generally is clay and sand with a few inches of black loam. A small saline stream runs easterly through the township in the southern part. This stream has a very wide valley over one hundred feet deep in places. There are a few willows and small poplars around the sloughs, the water in which is fresh and good. The grass around the sloughs is strong and luxurious. Quite a number of good hay sloughs occur. There are no water-powers. No stone quarries nor minerals occur. The township may be reached by trail from Battleford or Red Deer. This township seems fairly well adapted for mixed farming as there appear to be sufficient moisture and loam to produce grain or vegetables; it is at least a good township for grazing purposes.—*W. J. Deans, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 29.—The route to reach this township is by the trail, from Battleford going by Sounding lake, which is in good condition. The soil is hard clay with sand gravel and is stony, but suitable for grazing purposes. The surface is rolling open prairie, with no shrub or timber of any kind. There are only a few small hay marshes which are of poor quality. The water is mostly alkaline with very little fresh. There is not a sufficient supply and it is not permanent. There are no water-powers of any kind. The climate is good, and there are no summer frosts. There is no fuel. Wood can be procured at the Red Deer river. There are no coal or lignite veins nor minerals of any kind in the township. The game is mostly water fowl, with a few antelope.—*C. E. Lemoine, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 30.—The route to reach this township is by the trail from Battleford going by Sounding lake. It is in good condition. The soil is hard blue clay with sand and gravel, and is stony. It is suitable for grazing purposes. The surface is rolling open prairie, with no shrub nor timber of any kind. There are only a few small hay marshes which are of a poor quality. The water is mostly alkaline, with very little fresh, and the supply is not permanent nor sufficient. There are no water-powers of any kind. The climate is good, and there are no summer frosts. There is no fuel. Wood can be procured at Red Deer river. There are no coal nor lignite veins in the township, nor minerals. The game is mostly water fowl, with a few antelope.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 31.—The route to reach this township is by the trail from Battleford going by Sounding lake. It is in good condition. The soil is hard blue clay with sand and gravel, and is stony. It is suitable for grazing purposes. The surface is rolling open prairie with no shrub nor timber of any kind. There are a few small hay marshes which are of poor quality. The water is mostly alkaline with very little fresh. The supply is neither permanent nor sufficient. There are no water-powers of any kind. The climate is good and there are no summer frosts. There is no fuel. Wood can be procured at Red Deer river. There are no coal nor lignite veins in the township. No minerals occur. The game is mostly water fowl and a few antelope.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 32.—The route to reach this township is by the trail from Battleford going by Sounding lake. The trail is in good condition. The soil is hard blue clay with sand gravel, and is stony. It is suitable for grazing purposes. The surface is rolling open prairie, with no shrub nor timber of any kind. There are only a few small hay marshes which are of poor quality. The water is mostly alkaline with very little fresh. There is not sufficient supply and it is not permanent. There are no water-powers of any kind. The climate is good and there are no summer frosts. There is no fuel. Wood can be procured at Red Deer river. There are no coal nor lignite veins in the township. No minerals occur. The game is mostly waterfowl with a few antelope.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 33.—The nearest railroad point is Lacombe. A trail from Lacombe passes through township 38. The branch line of the Canadian Pacific railway from Lacombe passes through the same township. The construction of the road is well under way. The soil throughout this township is fair. The black loam ranges from three to ten inches in depth and generally has a subsoil of clay, though in a few places the subsoil is somewhat gravelly. The land is chiefly suited for ranching purposes. The surface is gently rolling, though the southeasterly portion is broken by a couple of water courses. There is neither timber nor scrub of any kind. The nearest fuel consists of poplar wood, located in township 37, range 9. There are numerous small

6-7 EDWARD VII., A. 1907

dried sloughs throughout the township where good hay grows, but the chief hay supply is found in a dried lake bed, the centre of which is about the position of the northeast corner of section 28. The area of this hay meadow is about 500 acres and it is quite capable of producing 800 tons of hay per season. Water is somewhat scarce, the chief supply being found in the pot holes along the water courses in the southeasterly portion of the township. This water is apparently a permanent supply and is of medium quality. The water in lake No. 1 is somewhat alkaline. There are no water-powers, neither are there stone quarries nor minerals of economic value. Game is scarce. Other than a few antelope and ducks nothing is to be seen.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 34.—The nearest railway point is Lacombe. A trail from this place passes through township 38. The Canadian Pacific railway branch line passes through the same township and is now under construction. The soil is second and third-class. There is usually found a few inches of black loam covering a subsoil of clay, sandy clay or gravel. The surface of the southerly portion of the township is gently rolling, but the northerly portion is broken by ravines running eastward towards Sounding creek. This township is of little use for farming and is only fair for ranching purposes. There is no timber, neither is there shrub of any kind. The nearest available fuel consists of poplar wood found on sections 4, 9 and others, in township 37, range 9. There are but few sloughs and fully fifty per cent of these are alkaline. There is one small alkaline lake on sections 17 and 20. There are no water-powers, neither are there stone quarries, nor minerals of economic value. Antelope is the only game to be found.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

Township 35.—This township is easiest reached from Lacombe, there being a good trail from that place passing through township 38. A branch line of the Canadian Pacific railway located from Lacombe eastward passes through the same township. This branch line is now being constructed. Township 35 is mostly third-class. A few quarter sections in the southerly portion of the township are second-class. The northerly portion is exceedingly hilly and broken. The hills are small, ranging to about 30 feet in height. Between these hills are numerous sloughs, ranging in area from 1 to 5 acres, and containing good water. The land is of little use for farming, but it is first-class for horse ranching, having in most places subsoil of stony clay, loam or gravel. There are numerous small hay sloughs but no large ones. The yield of hay could not be great. There is no timber in the township, and but little scrub. The latter grows in narrow bands about the sloughs where it is found. The nearest available fuel consists of poplar wood, and is found in township 37, range 9. There are no water-powers, neither are there stone quarries, nor minerals of economic value to be found. The climate is good. Very light summer frosts occurred. Antelope is the only game that is apparent.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 27.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in 31-38-16-4), and Lane's, in 2-38-15-4 where the road ends. From there I went across the prairie to the ground I had to survey, *i.e.*, town-

SESSIONAL PAPER No. 25b

ships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of clay, sandy clay and gumbo. Gravel is found in a good many pits. It is fairly good for farming. More than half the quarter sections are second-class. The township would not be good for ranching as in dry summers the water is apt to be very scarce and the grass to be poor. Besides, there is no shelter for cattle, such as gulleys or ravines. The whole township is prairie. Very little slough hay can be cut. The prairie grass is too short to be cut for hay. There were no creeks in the township with running water at the time of survey, and but one slough with water in it. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. It was very dry this summer though most of Alberta was wet. There is no fuel. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries and no minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 28.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian. Here the road ends. From here I went across the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of clay, sandy clay and gumbo, with gravel in many pits and stones only in a few. The soil is fairly good for farming, more than one-half of the quarter sections being second-class. Irrigation might be necessary, as it was very dry this summer in this township, though it was wet in northern Alberta. The whole township is prairie. Very little slough hay can be cut. The prairie grass is too short to be cut for hay. There are no creeks nor lakes in the township, and hardly any sloughs with water in them. The principal slough, with water in it, is the one on sections 27, 26, 35 and 36. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. There is no fuel. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries nor minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. There are no settlers in the township. This township would not be good for ranching, as there is no shelter for cattle, and as the grass is apt to be poor in dry summers.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 29.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in 31-38-16-4), and Lane's, in 2-38-15-4. Here the road ends. From here I went across the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of sand in a few sections in the southwest corner of the township, and of clay, sandy clay and gumbo for the rest of the township. In some parts there is gravel. In a few places stones are found. The soil is fairly good for farming. More than one-third of the quarter sections are second-class. There is a risk of having droughts, and irrigation might be necessary as the summer was very dry in this township, though the rest of Alberta was wet. The whole township is prairie. The prairie grass found is too short to be cut for hay, and there are but few hay sloughs. There is practically no

6-7 EDWARD VII., A. 1907

hay to be cut. The summer was dry and the water scarce, the little that was found being bad. There are no lakes. There are only dry sloughs to be seen. There are no water-powers. On sunny days it is warm, but on rainy days it is apt to be cold and raw, more so than it would be in Edmonton, for instance. We had, during the summer, several hailstorms, in one instance the stones were the size of the yolk of an egg. There is no fuel, except a few small bunches of scrub along the first meridian from the east. To get fuel in any quantity one would have to cross several townships or ranges. There are no stone quarries nor minerals. Antelope are plentiful, we saw some every day. These antelope are said to migrate westward in the fall, to the Rockies. This township is not looked upon as good for ranching. The grass is poor and the water is scarce in dry seasons, besides there is no shelter for the cattle, *i.e.*, no deep ravines or gulleys.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 30.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian where the road ends. From there I crossed the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. That part of the township lying southwest of the line running between sections 3 and 19, consists of sand and is unfit for agriculture. It includes one-fourth of the township. The rest of the township is composed of sandy clay, gumbo and clay. In a few instances, gravel or stones are found, and the soil belongs to classes two and three, this latter class predominating slightly. Three-fourths of the township is not especially good for farming. The whole township is prairie. The township is fairly level, with the exception of the valley of Sounding creek, which is from thirty-five to seventy-five feet deep. There are but few sloughs where hay can be cut, and not a great quantity could be cut. The prairie grass is too short to be cut for hay. The only water in the township is Sounding creek. Its water is alkaline. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in a wooded country. There was no frost while I was surveying the township. The only fuel is bunches of green willow found in the valley of Sounding creek. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries nor minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. The valley of Sounding creek would offer a good shelter for cattle, but in dry summers, like this one of 1905, the grass is too poor for ranching.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 31.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian) and Lane's, in section 2, township 38, range 15, west of the fourth meridian. Here the road ends. From here I went across the prairie to the ground I had to survey *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of sandy clay, gumbo and clay, and is fairly good for farming. More than half of the quarter sections are second-class. Stone and gravel are found in several places. The whole township is prairie. There are but few sloughs where hay can be cut, and but a small quantity could be cut for hay. There are no creeks in

SESSIONAL PAPER No. 25b

the township. There is one lake big enough to be surveyed in sections 35 and 36. Its water is alkaline. There is a long narrow slough in sections 22, 23, 24 and 27, where the water is fairly good. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. There is no fuel. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries nor minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. The township would not be good for ranching on account of its lacking shelter for cattle, and yielding but poor grass in dry summers.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 32.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian) and Lane's, in section 2, township 38, range 15, west of the fourth meridian, where the road ends. From there I crossed the prairie to the ground I had to survey, i.e., townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of sandy clay, gumbo and clay, and is fairly good for farming. More than half of the quarter sections are second-class. Stone and gravel are found in several places. The whole township is prairie. There are but few sloughs where hay can be cut, and but a small quantity could be cut. The prairie grass is too short to be cut for hay. There are no creeks and no lakes in the township. There are no water-powers. The climate is apt to be cold and raw on rainy days; more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. There is no fuel. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries nor minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. The township would not be good for ranching on account of its not having shelter for cattle, and yielding but poor grass in dry summers.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 33.—The best route for reaching this township is by a trail from Lacombe, which passes through township 38 of the same range. A branch line of the Canadian Pacific railway is now under construction from Lacombe and passes through the same township. The soil of this township is of a poor quality and is practically useless for agricultural purposes. For grazing, it is third-class. The soil in the southwest portion is sand. The balance is chiefly clay, having only three or four inches of black loam upon it. The surface is gently rolling and without scrub of any kind. There are five lakes in the township, all of which are alkaline or partly so. There are no streams and but few sloughs. Hay is scarce, other than that which is found in a partly dried slough or lake along the northern portion of section 23. Approximately, 150 tons could have been cut there during the season of 1905. There is no fuel. The nearest consists of poplar wood and is located in township 37, range 9. The climate is good. No frosts occurred while the survey was being made. There are no water-powers, neither are there stone quarries nor minerals of economic value. The only game is antelope. Ducks are scarce.—*R. H. Knight, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 34.—The best route for reaching this township is by a trail from Lacombe, which passes through township 38 of the same range. A branch line of the Canadian Pacific railway is now being constructed from Lacombe and passes through the same township. The soil of this township consists of three or four inches of black loam with a subsoil of clay. The surface is gently rolling and without scrub of any kind. For agricultural purposes, the township ranges a little poorer than second-class and is about the same for ranching. The southern 60 per cent of the township has neither hay nor sloughs, while the balance has a fair amount of both. The water is of a fair quality. There is no fuel. The nearest fuel consists of poplar wood and is located in township 37, range 9. The climate is good. No frosts occurred while the survey was being made. There are no water-powers, neither are there stone quarries, nor minerals of economic value. The only game is antelope. Ducks are scarce.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 35.—The best route for reaching this township is by a trail from Lacombe, which passes through the township as does also a branch line survey of the Canadian Pacific railway from Lacombe. The soil is of many varieties. It ranges from the richest to the most barren. The northerly 60 per cent of the township is very rough and hilly. It consists altogether of small hills from 30 to 40 feet high. Between these hills are found small ponds with areas from 5 acres down. About many of these small ponds there grows a narrow fringe of small willow scrub which is about the only shrub in the township. For agricultural purposes this portion of the township is useless. It is quite suited for grazing, as there is plenty of good water and grass. There are no hay sloughs. The southern 40 per cent of township 35 is gently rolling or nearly level, and is second-class for agricultural purposes. There is no fuel. The nearest fuel consists of poplar wood located in township 37, range 9. The climate is good. No frosts occurred while the survey was being made. There are no water-powers, neither are there stone quarries nor minerals of economic value. The game found is confined to duck and antelope.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8.

Township 52.—The best way to reach this township is from Vermilion river where the old Edmonton and Battleford wagon road crosses it. From this point there is a good road north. The soil is first-class, suitable for farming purposes. The west half is covered with light woods, scrub and brush, and the east half with thick poplar from two to ten inches in diameter. There is some hay around the lake in the west part of the township. The water is fresh and good. There are no water-powers. The climate is delightful and summer frosts are rare. Good wood may be had for fuel. No stone quarries nor other minerals are found exposed. Duck and fish are plentiful.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 27.—From Edmonton I reached Wetaskiwin by railway, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Red-

SESSIONAL PAPER No. 25b

willow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian. Here the road ends. From here I went across the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of clay, sandy clay and gumbo, with gravel in many pits, and stones in only a few. The soil is good for farming. Nearly all the land is second-class. Irrigation might be necessary for farming, as it was very dry this summer in the township. The township would not be good for ranching in dry years. It might be good in wet seasons. The whole township is prairie. In dry seasons no slough hay can be cut. The prairie grass is too short to be cut for hay. There are no lakes. The only water found was in a slough and in the lower part of Blood Indian creek, and this water was not running and was very alkaline. There was no frost while we were surveying. It is apt to be colder on rainy days than in timbered country. There are no water-powers. There is no fuel. Probably many townships or ranges would have to be covered to find firewood in any quantity. There are no stone quarries nor minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 28.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian where the road ends. From there I crossed the prairie to the ground I had to survey, *i.e.*, townships 27 and 32, ranges 8 and 9, west of the fourth meridian. The soil consists of gumbo, clay and sandy clay. One-fourth of the quarter sections belong to class number three, and the rest to classes one and two, only six quarter sections being class one. Gravel is found in one-fourth of the pits. The soil is good for farming. In dry summers, like 1905, irrigation would be necessary. The whole township is prairie. The surface is fairly level. In dry summers, like 1905, there are no places where hay can be cut, and the grass is short. In wet summers, hay would not be so scarce nor the grass so short. In 1905 there were no creeks running and no sloughs with water in them in the township. The township is drained by Blood Indian creek in wet years. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in wooded country. There was no frost while I was surveying the township. There is no fuel. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries and no minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. The township would not be good for ranching, on account of its not having shelter for cattle, and having poor grass and no water in dry summers.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 29.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian where the road ends. From there I crossed the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of gumbo, sandy clay and clay. Gravel or stones are found in over one-quarter of the pits, still the soil is good for farming and two-thirds of the homesteads are second-

6-7 EDWARD VII., A. 1907

class. The township would not be good for ranching, as there is no shelter for cattle, and the grass is apt to be poor in dry summers, as this year. The whole township is prairie. It is fairly level. The prairie grass is too short to be cut for hay. There are but few sloughs where hay may be cut in any quantity. Water was found in Togo lake, but it was very alkaline. Its outlet was dry. Outside of that, water was found in only two or three sloughs in the whole township. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in wooded country. There was no frost while I was surveying the township. We had a hail-storm. There is no fuel of any kind. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries and no minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 30.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian where the road ends. From there I crossed the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil in the northeast corner of the township is sandy and unfit for farming. The sand covers all that part of the township lying northeast of a line running between sections 12 and 34. As to the rest of the township, it consists mostly of clay and sandy clay, and the homesteads are about equally divided into second-class and third-class lands. As for ranching, the township offers fair shelter along Sounding creek. The water of the creek is alkaline, and in dry summers, the grass is poor. Consequently, the township is not good for ranching. The whole township is prairie and is rather level. A few bunches of willows and small poplars are seen along Sounding creek. The prairie grass is too short to be cut for hay. There are no sloughs where hay can be cut in any quantity. Sounding creek is the only stream in the township, and its water is alkaline. It was hardly running this summer. Water was not found in any other place. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in a wooded country. There was no frost while I was surveying the township. The only fuel is bunches of green willow and small poplar. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries and no minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 31.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian, where the road ends. From there I went across the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists mostly of sand. Clay and sandy clay are found in but few places in the centre of the township and along its southern boundary. Most of the ground is worthless for farming. The township offers no shelter for cattle and on that account may not be good for ranchers. Besides, in dry summers, the grass is apt to be scarce. The whole township is prairie. A few bunches of willows and small poplars are seen in the

SESSIONAL PAPER No. 25b

centre of the township. The prairie grass is too short to be cut for hay. There are no sloughs where hay can be cut in any quantity. A substitute for hay might be found in the tall grass growing along the southeast side of Antelope lake. There is only one creek in the township, Sounding creek, and it was dry this summer, except at its south end where it was scarcely running. Antelope lake was low, and its water not fit to drink. It is alkaline. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. The only fuel is bunches of green willows and small poplars. There are no stone quarries and no minerals. Antelope are plentiful. They are said to come from the Rockies in the spring and to go back there for the winter.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 32.—From Edmonton I reached Wetaskiwin by railroad, thence, following a southeasterly direction, I went by wagon through Lewisville, Edensville, Redwillow, Dora (a new post office in section 31, township 38, range 16, west of the fourth meridian), and Lane's, in section 2, township 38, range 15, west of the fourth meridian. There the road ends. From there I went across the prairie to the ground I had to survey, *i.e.*, townships 27 to 32, ranges 8 and 9, west of the fourth meridian. The soil consists of sand in the western half of the township and in part of the south end of the eastern half, and is not good for farming. The rest of the township consists of gumbo (which is a very hard soil of a brown colour), of clay, and of sandy clay, and is fairly good for farming. The northeast corner of the township, to the extent of five or six sections is second-class. The whole township is prairie. A few bunches of willows and small poplars are seen in the township. The prairie grass is too short to be cut for hay. There are no sloughs where hay may be cut in any quantity. Sounding creek is the only creek in the township; it crosses the southwest corner of section 6. The creek was not running at the time of the survey, but there were pools of water in its bed. Outside of that, water was found in only two or three sloughs in the whole township. There are no water-powers. The climate is apt to be cold and raw on rainy days, more so than it would be in Edmonton, for instance. There was no frost while I was surveying the township. The only fuel is bunches of green willow and small poplar. Probably many townships or ranges would have to be crossed to find firewood in any quantity. There are no stone quarries and no minerals. Antelope are numerous. They are said to come from the Rockies in the spring and to go back there for the winter. The township would not be suitable for ranching, as there is no shelter for cattle, *ie.*, no deep ravines or gullies, and the grass is apt to be short and the water scarce in dry seasons.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 33.—This township is easiest reached by a good trail from Lacombe, which passes about 25 miles north of the township. A branch line of the Canadian Pacific railway from Lacombe is being constructed. The location of this line passes through township 38, range 9. The soil of township 33 on the whole ranges between second and third-class. The northerly half is largely sandy prairie, while the southerly half has but a shallow black loam covering a sandy or hard clay subsoil. The surface is gently rolling or else nearly level. There is no scrub nor fuel of any kind, the nearest available being poplar wood found in township 37, range 9. Hay is scarce. There are but few sloughs. The water in the lakes is alkaline. The climate is good, though considerable rain fell during the month of June and occasional light summer frosts occurred. There are no stone quarries, neither are there water-powers. Minerals of economic value are not apparent. The game most abundant is antelope.—*R.H. Knight, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 34.—This township is easiest reached by a good trail from Lacombe, which trail passes about 25 miles north of the township. A branch line of the Canadian Pacific railway from Lacombe is being constructed through township 38, range 9. The soil of the southern half of this township is sandy and quite useless for agricultural purposes and third-class for ranching. The northerly half ranges about second-class for either ranching or farming. The subsoil which is covered by 4 to 10 inches of black loam is generally a hard clay. The surface of the township is nearly level or gently rolling prairie. A few small patches of scrub are found on sections 18 and 19. Hay is scarce. There are but few sloughs. The water in lakes 1, 2 and 3 is alkaline. The climate is good, though considerable rain fell during the month of June, and occasional light summer frosts occurred. There are no stone quarries, neither are there minerals of economic value. There is no fuel; the nearest available being poplar wood in township 37, range 9. The only game found is antelope.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 35.—This township is easiest reached by a good trail from Lacombe, which trail passes about 25 miles north of the township. A branch line of the Canadian Pacific railway from Lacombe is being constructed through township 38, range 9. This township may be considered about second-class for farming and about first-class for ranching. The soil on an average consists of 8 inches black loam with a subsoil of hard clay. The land is gently rolling and only an odd bunch of small willows can be found. There are numerous small sloughs, many of which have dried up during the past two seasons. The easterly four miles of the township is superior to the westerly portion. There is no fuel; the nearest consists of poplar wood found in township 37, range 9. There are no water-powers neither are there stone quarries nor minerals of economic value. The climate is good, though considerable rain fell during the month of June, and occasional light summer frosts occurred. Antelope is the only game found.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 9.

Township 36.—This township is easiest reached by a good trail from Lacombe and passing through township 38. The soil throughout is chiefly clay and more adapted to grazing than farming. The township surface is practically all rolling and is prairie, though some small clumps of scrub are found in places. Along the creeks the land is broken by coulées. There is no timber in the township. There are some large hay sloughs. The water generally is alkaline. The creek described in township 36, range 10, passes across the northwest corner and leaves the township in section 32. Nose creek crosses the east boundaries of sections 35 and 34, and crosses north into township 37, range 9. There were light frosts during the survey. Small poplars are found along Nose creek, but to get wood it is necessary to go into township 37, range 9. No coal or lignite seams were discovered in the township. There are no stone quarries, neither are there minerals of economic value to be found. Ducks are plentiful and there are a few antelope.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 27.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, and thence, south-

SESSIONAL PAPER No. 25b

easterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists almost entirely of clay and is suitable for a summer range for stock. The surface is open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, there being none when I visited the township. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 28.—The best route for reaching this township is easterly from Lacombe for about eighty miles following the road allowances and trails, thence southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists almost entirely of clay and is suitable for a summer range for stock. The surface is open prairie, there being no timber of any kind. The water supply is not permanent, there being none at the time I visited it. There are no hay lands. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frost may be expected in all other months of the year, with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 29.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, thence across the prairie. The roads were in first-class condition during the whole of the summer, but might easily be soft in wet weather especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam with a clay subsoil and is suitable for a summer range for stock. The surface is open prairie. There being no timber of any kind. There are no hay lands. The water supply consists only of an alkaline lake on sections 28, 21, 29, 20, 19, 17 and 18. The water is totally unfit for domestic use, but such as it is, it may be considered permanent. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September. There are no stone quarries no minerals of any kind, and no fuel. The wild animals found are antelope, skunk, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 30.—The best route for reaching this township is easterly from Lacombe for about eighty miles, and thence southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either

6-7 EDWARD VII., A. 1907

clay or sandy loam with a clay subsoil, and is suitable for a summer range for stock. The surface is entirely open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, in fact there is none with the exception of one fresh water lake on sections 7 and 18. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in every other month of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 31.—The best route for reaching this township is easterly from Lacombe for about eighty miles, then southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam, with a clay subsoil and is suitable for a summer range for stock. The surface is entirely open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, only small quantities were found in low places during the early part of the summer. There are also two alkaline lakes, the water of which is unfit for domestic use. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 32.—The best route for reaching this township is easterly from Lacombe, following the road allowances and trails for about eighty miles, thence southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam with a clay subsoil, with the exception of the northeast corner of the township which is sand almost entirely. It is suitable for a summer range for stock. The surface consists of open prairie with some willow brush in the northwest corner, there being no timber of any kind. There are no hay lands. The water supply is not permanent with the exception of some alkaline lakes, the water of which is unfit for domestic use. Lost creek rises in this township but it was so nearly dry in the month of June that water was found only in some deep places along its bed. There are no water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 33.—A good trail from Ponoka passes about twenty-five miles north of this township. The soil is partly sand and partly clay in about equal proportions.

SESSIONAL PAPER No. 25b

It is suitable for general farming, though none of it is of high grade. There is no timber of any kind. The surface is rolling. Kirkpatrick lake covers about six sections of the northeast corner of the township. The lake is not more than eight feet deep at present. The water is muddy and alkaline. There are several large sloughs and one creek, but none of these afford very good water. No frosts occurred during the progress of my work. There is no fuel available nearer than Sullivan lake. There are no stone quarries. No minerals were seen. Antelope were seen frequently. Ducks and geese were numerous.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 34.—This township can be conveniently reached by a good trail from Ponoka. The soil varies from sandy loam to clay, over one-third being black loam with clay or sand subsoil, and in a few places gravel. It produces good grass and is well adapted for mixed farming. The surface is open rolling prairie. There is no timber. There are a few hay sloughs, though not of large extent. A part of Kirkpatrick lake and four other small lakes are in this township and one small creek flows into Kirkpatrick lake. The water in all these is muddy and alkaline. It is quite probable that good water can be had at a moderate depth by sinking wells. There were no frosts during the progress of my work, and as there are no settlers I could not obtain any information as to general climatic conditions. The nearest source of fuel supply is at Sullivan lake where coal is obtainable. There are no stone quarries. No minerals were observed. Ducks and geese are plentiful. Antelope were seen occasionally.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 35.—This township is reached by trail from Ponoka. The trail is in fair condition and passes about 15 miles north of the township. The soil varies from light sandy loam to heavy clay and is suitable for mixed farming. The surface is open prairie, slightly rolling. There is no timber of any kind. On sections 10 and 15 there is a luxuriant growth of hay. No other extensive areas of hay land were noticed. Hamilton lake covers an area of over six sections in this township. The water is very muddy and somewhat alkaline. At this time the water is low, not more than six or eight feet being the depth in the centre of lake. There are no running streams but dry, or partially dry, creek beds indicate where streams would appear in wet seasons. It is quite probable that good water could be had at a moderate depth by digging wells. No summer frosts were observed. There is no fuel available within 30 miles. There are no stone quarries. No minerals were observed. Geese, ducks and prairie chickens are numerous. Antelope were seen occasionally as also badgers and skunks. The lack of transportation facilities will be overcome in time when this land will doubtless be taken up for farming purposes.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 36.—This township is most easily reached by a good trail from Lacombe, which passes through township 38 and which is the nearest trail to township 36. The soil is mostly heavy clay and not adapted to farming, but makes very good pasture land. The country is practically all prairie with here and there a few clumps of small poplar and willow scrub. No timber occurs. The water is somewhat alkaline and there are but few hay sloughs. A small stream crosses the east boundaries of sections 18, 17,

16, 22 and 26 and the north boundary of section 23 in an easterly direction. The stream is not permanent in dry seasons and is of no use for power purposes. There were light frosts when the survey was being made, but generally speaking, the climate is good. The only and nearest available fuel consists of poplar, which occurs in township 37, range 9. No coal, lignite nor quarries occur, nor minerals of economic value. Ducks and antelope were the only game seen.—*R. H. Knight, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 10.

Township 42.—This township is most easily reached by a good trail from Lacombe, which passes through the southeasterly portion of the township and is designated 'old mail trail.' Another trail from Wetaskiwin passes through the adjoining township to the north. The soil of this township is varied. The southwesterly portion (quarter of township) consists of a black loam having a subsoil of clay loam. This portion is adapted to grain growing. The balance of the township is suited only for grazing, for where the soil is not sandy it is dry and has a hilly surface. Generally the surface is rough and hilly, excepting the southwesterly portion above mentioned. The township is quite bluffy. Poplar up to five inches in diameter occurs in 50 per cent of the bluffs, the balance of the bluffs being younger poplars with small willows. On the north half of section 33 there is considerable poplar timber up to twelve inches in diameter. Sections 25, 26, 27, 34 and 35 contain considerable quantities of poplar up to seven inches in diameter. There are no hay sloughs but many small lakes occur. The water in these lakes is somewhat alkaline, but not bad. Battle river runs northward through the western portion of the township. The water is good and is permanent. The current rate is about one and one-half miles per hour. Spring floods occur, and in many places the river overflows its banks. There are no water-powers. The climate is good and quite suited for agricultural purposes. The fuel available consists of poplar wood and is easily secured within the township. There are no stone quarries nor minerals of economic value. Game is scarce, a few ducks being the only game seen.—*R. H. Knight D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 27.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, thence across the prairie in a southeasterly direction. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists almost entirely of clay. The surface is open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, there being none when I visited the locality. There are no streams nor water-powers. The climate is very dry, and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in every other month of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 28.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, thence southeasterly across the prairie. The roads were in first-class condition during the whole

SESSIONAL PAPER No. 25b

of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists almost entirely of clay and is suitable for a summer range for stock. The surface is open prairie, there being no timber of any kind. The water supply might be considered permanent, although in small quantities, and found only in the bed of Berry creek which runs through sections 33, 28, 21, 20, 17, 18 and touches a corner of section 7. The creek ceased running in the month of May and its bed was dry in many places the rest of the summer. There are other stream beds, but all dry. There are no hay lands nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 29.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails and thence southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists almost entirely of clay, sandy loam and clay loam being found only in a few places. It is suitable for a summer range for stock. There are no hay lands. The surface is open prairie, there being no timber of any kind. The water supply might be considered permanent, although in small quantities and found only in the bed of Berry creek, which runs through sections 31, 29, 26, 16, 9, 8 and 4. The creek ceased running in the month of May, and its bed was dry in many places the rest of the summer. This stream does not afford water-power. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 30.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, thence across the prairie in a southeasterly direction. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam with a clay subsoil and is suitable for a summer range for stock. The surface is entirely open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent. One lake may be found on sections 12 and 13 which is the only water in the township. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There are no stone quarries nor minerals of any kind, and no fuel. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 31.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, and then southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam with a clay subsoil and is suitable for a summer range for stock. The surface is entirely open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, there being only small quantities in low places. Two fresh water lakes will be found on sections 19, 30 and 31. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient rainfall to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There is no fuel, stone quarries nor minerals of any kind. The wild animals found are antelope, skunks, coyotes, foxes, badgers and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 32.—The best route for reaching this township is easterly from Lacombe for about eighty miles, following the road allowances and trails, and then southeasterly across the prairie. The roads were in first-class condition during the whole of this summer, but might easily be soft in wet weather, especially in the spring of the year. The soil consists of a thin layer of either clay or sandy loam with a clay subsoil and is suitable for a summer range for stock. The surface consists entirely of open prairie, there being no timber of any kind. There are no hay lands. The water supply is not permanent, only small quantities were met with in low spots. There are no streams nor water-powers. The climate is very dry and there is every evidence of insufficient moisture to mature a crop. There were no frosts in the months of July, August and September, but frosts may be expected in all other months of the year with the exception of June. There is no fuel, stone quarries nor minerals of any kind. The wild animals found are antelope, skunks, coyotes, foxes, badgers, rabbits and gophers.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 33.—A good trail from Ponoka passes within twenty-five miles of this township. The soil is chiefly clay and in several places stony with considerable gravel. The surface is rolling without any timber whatever. There are no springs nor running creeks, the only water being in sloughs. No doubt good water can be had at a moderate depth by sinking wells. There were no frosts during the progress of my work. Fuel is not obtainable nearer than Sullivan lake where coal can be had. There are no stone quarries. No minerals were observed. Badgers, skunks, foxes and antelope were seen occasionally. Ducks and geese were plentiful in the neighbourhood of the sloughs. There are no hay sloughs. The soil produces fairly good grass, but I do not consider that it can be rated as higher than third-class for farming purposes.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 34.—I found it most convenient to reach this township by trail from Ponoka. The trail is in good condition. Distance by trail is about 130 miles. A

SESSIONAL PAPER No. 25b

branch railway line from Lacombe is now graded to a point within about 45 miles. When this is opened for traffic it will afford the best means of access to this and neighboring townships. The soil is variable, gravelly clay predominating and none of it will rank as higher than third-class. It produces fairly good grass, and a considerable portion is suitable for the cultivation of cereals. The surface is open rolling prairie. There is no timber of any kind. There are no hay marshes of any considerable extent. There are a few lakes in which the water is shallow, muddy and alkaline. No springs or running creeks of good fresh water were seen. The nature of the soil would appear to indicate that good water can be obtained by sinking wells. I did not observe any frosts during progress of my work. Limited time did not permit of obtaining information as to general climatic conditions. There is no local fuel supply. The nearest available is at Sullivan lake where coal is obtainable. There are no stone quarries. The stone noted in connection with soil report consists of loose boulders of which in some sections there is a considerable quantity. No minerals were observed. Ducks and geese were plentiful along the lakes and sloughs. Antelope, foxes, prairie wolves, badgers and skunks were seen occasionally.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 35.—A trail from Ponoka passes about fifteen miles to the north of this township and is in fairly good condition. In a considerable part of the township the soil is black loam with clay subsoil. In other portions the soil is sand or sandy loam. The surface is rolling open prairie with no timber of any kind, except a few clumps of small poplar in the northeast corner. There are no hay marshes of any considerable extent. No springs or running streams were to be seen. A partially dry creek bed extends across a considerable portion of the township. There is no running water in it at present. Indications of good fresh water at a moderate depth below the surface were observed. Climate is good and no special danger of summer frosts was apparent. Fuel is not obtainable nearer than Sullivan lake where there is a deposit of coal, about 20 miles from this township. The nearest wood available is at least 30 miles distant. There are no stone quarries. No minerals were observed. Ducks, geese and prairie chickens were the only game seen. This township is suitable for general farming purposes and will no doubt be taken up for that as soon as transportation obstacles are overcome.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 61.—The best way to reach this township is by the Saddle lake and Floatingstone lake wagon road which passes within a mile of the southwest corner of the township. This road is good to that point. The soil is number one and suitable for farming. The surface is covered with brush and scrub and scattered poplar from two to ten inches in diameter. There is no hay land. The water is fresh and good and the land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts rare. There is good wood for fuel. No evidences of stone quarries nor minerals were found. Fish and ducks are abundant.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 62.—The best way to reach this township is by a wagon road which we cut out from the Saddle lake and Lake LaBiche wagon road from the Indian reserve near Whitefish lake. This is not a very good road. The soil in this township is good

6-7 EDWARD VII., A. 1907

and suitable for farming. The surface is covered with poplar from two to ten inches in diameter and scattered spruce. There are no hay lands. The water is fresh and good. Several small streams are found, but the land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts rare. There is plenty of good wood for fuel. No stone quarries nor other minerals were discovered. Duck, fish, deer and moose were seen.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 63.—A fair road for wagons from St. Paul de Metis to Lake LaBiche passes across this township from section 1 to section 30. The soil is good and suitable for general farming. The surface is covered with poplar from three inches to twelve inches in diameter with clumps of spruce. There is no hay land. There is a good supply of fresh water. Beaver river crosses the township from section 7 to section 2. There are no valuable water-powers. The land is not liable to be flooded. The climate is delightful and summer frosts are rare. There is a good supply of wood for fuel. There are no valuable minerals exposed. There are deer and duck for game. There is no valuable timber in the township.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 11.

Township 64.—The best way to reach this township is by the wagon road going from St. Paul de Metis to Lake LaBiche, which passes within a mile of the southwest corner of the township. The soil is first-class and suitable for farming. The surface is covered with thick woods, chiefly poplar, from two to ten inches in diameter, with small scattered spruce. There is no hay land. The water is fresh and good and the land not liable to be flooded as the streams are small. There are no water-powers. The climate is delightful and summer frosts are not usual. Good wood can be obtained for fuel. No stone quarries nor minerals of any kind were seen. Duck and fish abound.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 27.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough alkaline, clay gumbo. The surface is rolling prairie with coulees. No commercial timber occurs. There is no hay. Good water is found in Berry creek. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearance of the country it can be assumed as semi-arid. Small willows is the only fuel to be found. No rock in situ suitable for building purposes was observed. No indications of minerals were noticed. Antelope appear to be numerous; Feathered game were only occasionally seen.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 28.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough alkaline clay gumbo. The surface is rolling prairie with a few coulées. No commercial tim-

SESSIONAL PAPER No. 25b

ber occurs. Slough grass, fit for cutting, was found, but no good hay. There is good fresh water in Berry creek. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearance of the country it can be assumed as semi-arid. The only fuel is small willows. No rock in situ suitable for building purposes was observed. No indications of minerals were noticed. Antelope appear to be numerous; there are also a few geese and duck but very few prairie chicken.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 29.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough alkaline, clay gumbo. The surface is rolling prairie with coulées. No commercial timber occurs. There is a little slough grass but no good hay. There is good fresh water in Berry creek. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearance of the country it can be assumed as semi-arid. Small willows is the only fuel found. No rock in situ suitable for building purposes was observed. No indications of minerals were seen. Antelope appear to be numerous; feathered game were only occasionally seen.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 30.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough, alkaline, clay gumbo. The surface is rolling prairie with coulées. No commercial timber occurs. There is a little slough grass but no good hay. There is good fresh water in Berry creek. No water-powers are available. The climate is very similar to that at Calgary. Small willow is the only fuel found. No rock in situ suitable for building purposes was observed. No indications of minerals were seen. Antelope appear to be numerous, feathered game is not so plentiful.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12

Township 31.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough, alkaline, clay gumbo. The surface is rolling prairie and flat prairie. No commercial timber occurs. Slough grass but very little good hay, was found. There is good fresh water in Berry creek. No water-powers are available. The climate is very similar to that at Calgary. Small willow is the only fuel round. No rock in situ suitable for building purposes was observed. There is no indication of minerals. Antelope appear to be numerous; feathered game is not plentiful.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 32.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough, alkaline,

6-7 EDWARD VII., A. 1907

clay gumbo. The surface is rolling prairie and flat prairie. No commercial timber occurs. There is slough grass, but very little good hay. There is good fresh water in Berry creek. No water-powers are available. The climate is very similar to that at Calgary. Small willows is the only fuel found. No rock in situ suitable for building purposes was observed. There is no indication of minerals. Antelope appear to be numerous; feathered game was only occasionally seen.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 33.—A good trail from Ponoka passes twenty-five miles north of this township. The soil is heavy clay, and is suitable for general farming purposes, though not so desirable as a warmer soil. The surface is open rolling prairie without any timber whatever. There are no hay marshes of any considerable extent. The water in two small lakes is muddy and alkaline. A creek bed extends across the township, but there is no running water in it at present. Probably good water could be had at a moderate depth by sinking wells. There were no frosts while my work was in progress. No fuel is available nearer than Sullivan lake where coal is to be had. There are no stone quarries. No minerals were observed. Antelope were seen occasionally as also geese and duck.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 34.—A good trail from Ponoka passes within fifteen miles of this township. The surface is open rolling prairie. The soil is principally clay, producing good grass, and well adapted for grain growing. There is no timber of any kind. There are no large areas of hay land. Craig lake covers an area equivalent to over three sections. It is shallow and muddy, and the water is alkaline. There are no springs or creeks of fresh water, though good water can doubtless be obtained at moderate depths by sinking wells. No summer frosts occurred during the progress of my work. Fuel is not obtainable within 20 miles, the nearest supply being coal at Sullivan lake. There are no stone quarries. No minerals were observed. Geese and duck were numerous. This land will no doubt be occupied for mixed farming purposes as soon as transportation obstacles are overcome.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 35.—The township is reached by a trail from Ponoka, passing about 15 miles north, which is in fair condition. The soil varies from light sandy loam to heavy clay and is suitable for general farming purposes. The surface is open prairie, for the most part gently rolling. There is no timber of any kind. There are no hay marshes of any considerable extent. Good fresh water is lacking but could doubtless be had at a moderate depth by sinking wells. The surface water is somewhat alkaline. There are no indications of special danger of summer frosts. Fuel is lacking. No wood is to be had within twenty miles. There are no stone quarries. No minerals were noticed. Duck, geese and prairie chicken were the only game seen. A considerable portion of this land is suitable for settlement, and will no doubt be taken up as soon as transportation difficulties are removed.—*George Edwards, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 58.—The Saddle lake and Lake LaBiche wagon road passes through this township and is a very good road. The soil is first-class and suitable for general farming. The west and south of the township is covered with scattered woods and brush and scrub, easily cleared, while the east is more heavily wooded. The timber is chiefly poplar. There is some hay of fair quality around the lakes in the east part of the township. The water is all fresh and good. There are no streams of any size, and the land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts are not usual. There is plenty of wood for fuel. No stone quarries nor minerals were found. Large numbers of duck in season and fish at all times are to be had.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 59.—The Saddle lake and Lake LaBiche wagon road passes through this township and is a very good road. The soil is first-class and suitable for general farming. The west and south of the township is covered with scattered woods and bush and scrub, easily cleared, while the east is more heavily wooded. The timber is chiefly poplar. There is some hay of fair quality around the lakes in the east part of the township. The water is all fresh and good. There are no streams of any size and the land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts are not usual. There is plenty of wood for fuel. No stone quarries nor minerals were found. Large numbers of duck in season and fish at all times are to be had.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 60.—This township is best reached by the Saddle lake, Lake LaBiche or the St. Paul de Metis, Floatingstone lake wagon roads. They are both good and both cross the township. The soil is number one and suitable for farming. The surface is covered with poplar from two to ten inches in diameter, except in the northeast part where it is covered with brush easily cleared. There are no hay lands. The water is fresh and good, and the land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts rare. Cord wood can be had for fuel. No stone quarries nor other minerals exist. Fish and duck abound.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 61.—The best way to reach this township is by the Saddle lake, Lake LaBiche wagon road which is good and passes across the township. The soil is number one and suitable for farming. The surface is covered with brush and scrub and scattered poplar from two to ten inches in diameter. It can be easily cleared. There are some hay lands in the southern and in the northern parts of the township. The water is fresh and good. Bridge creek crosses from the northwest corner to the southeast corner. This creek is about a foot deep and six feet wide. The land is not liable to be flooded. There are no water-powers. The climate is delightful and summer frosts rare. Good wood can be obtained for fuel. No stone quarries or other minerals are found exposed. There are plenty of duck and fish.—*M. W. Hopkins, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 62.—The best way to reach this township is by the Saddle lake and Lake LaBiche wagon road which passes within a mile of the west of the township, and is good. The soil is good, except the two mile middle strip, from west to east, which has much muskeg. The land is suitable for farming. The surface, except in the muskeg is covered with poplar from two to ten inches in diameter with scattered spruce of the same size. There is no hay land. The water is fresh and good and the land is not liable to be flooded, except the muskeg. There are no water-powers. The climate is delightful and summer frosts are rare. There is plenty of good wood for fuel. No stone quarries nor other minerals were noticed. Duck and fish and some deer and moose comprise the game.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 12.

Township 63.—The good wagon road from Saddle lake to Lake LaBiche passes through the west side of the township. The soil is good and suitable for general farming. The surface is covered with woods, poplar from three inches to twelve inches in diameter with clumps of spruce. There is no hay land in the township. Beaver river crosses the township from west to east and Little Beaver enters the Beaver in section 20. There is a good supply of fresh water. The land is not liable to be flooded. There are no valuable water-powers. The climate is delightful and summer frosts are rare. There is plenty of good wood for fuel. There are no valuable minerals exposed. There are deer and duck for game. There is no valuable timber in the township.—*M. W. Hopkins, D.L.S., 1905.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 12.

Township 64.—The best way to reach this township is by the Saddle lake and Lake LaBiche wagon road, which is in good repair and passes within two miles of the west boundary of the township. The soil is number one, except the middle two miles from east to west which has much muskeg. The land is suitable for farming. The surface is covered with thick woods, except in the muskeg. The wood is chiefly poplar from two to eight inches in diameter with clumps of spruce of about the same size. There are no hay lands. The water is fresh and good. Small streams and many lakes occur. The land is not liable to be flooded, except the muskeg. There are no water-powers. The climate is delightful and summer frosts rare. There is abundant good wood for fuel. No stone quarries nor other minerals were discovered. Plenty of duck and fish and some deer and moose were seen.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 12.—From the village of Swift Current, Saskatchewan, the Mennonite trail was followed into this township for a distance of twenty miles. The soil is generally a black sandy clay loam, ten inches deep, with a sandy clay subsoil. The northern part of the township is gently undulating. The southern portion is easy rolling. No timber occurs in the township. No hay lands proper occur, the native prairie grass furnishes the only supply. No creeks or ponds occur, but water is found at an average depth of thirty feet by digging. No water-powers exist in this township. The township is located at about the extreme edge of the country visited by chinook winds, the average rainfall, it is claimed by near residents, is greater than at

SESSIONAL PAPER No. 25b

Moosejaw and the average winter temperature also slightly higher. There is no fuel available in the township, but proximity to the railway ensures a coal supply. There are no stone quarries. There are no minerals. Antelope is the sole representative of game. The soil, climate and grasses give every indication of agricultural possibilities. The township is first-class in every respect.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 27.—From the town of Gleichen the trail to Hyde's crossing Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough, alkaline, clay gumbo. The surface is rolling prairie with a little scrub. No commercial timber occurs. No hay was found but there is grass from three to six inches long. The only water in this township is a small slough in section 35. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearance of the country it can be assumed as semi-arid. Fuel is entirely absent and has to be imported, wood forty miles, coal, about thirty miles. No rock in situ suitable for building purposes was noticed. There is no indication of minerals. Antelope appear to be numerous; feathered game were only occasionally seen.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 28.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being of tough, clay gumbo. The surface is rolling prairie. No commercial timber occurs. A little slough grass was found, but no first-class hay. There is no water at the present time in this township but there are some dry hay sloughs. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearance of the country it can be assumed as semi-arid. Fuel is entirely absent. Coal and wood can be had at a distance of thirty or forty miles. No rock in situ suitable for building purposes was noticed. There are no indications of minerals. Antelope appear to be numerous; feathered game was only seen occasionally.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 29.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being of a tough, clay gumbo. On some of the hills, there is a few inches of sandy subsoil. The surface is rolling prairie with coulées. No commercial timber occurs. No good hay was found but there is a little slough grass. There is fresh water in some of the sloughs. No water-powers are available. The climate is very similar to that at Calgary, but from the general appearances of the country it can be assumed as semi-arid. Slight traces of coal were found, but there is no wood. No rock in situ suitable for building purposes occurs. Traces of coal and ironstone were noticed. Antelope appear to be numerous, also a few geese and duck are to be seen.—A. W. Ponton, D.L.S., 1905.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 30.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the

6-7 EDWARD VII., A. 1907

above-mentioned township. The soil is generally third-class, being of a tough, clay gumbo. The surface is rolling prairie with a few coulées. No commercial timber occurs. Plenty of slough grass but very little good hay was found. Some of the slough water is fresh and some alkaline. There are no water-powers available. The climate is very similar to that at Calgary, but there does not appear to be much rain. There is no fuel. No rock in situ suitable for building purposes was noticed. There are no indications of minerals. Antelope appear to be numerous; feathered game is not so plentiful.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 31.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken and from here it was necessary to travel across country to the above-mentioned township. The soil is generally third-class, being a tough, alkaline gumbo. The country is rolling, with coulées. No commercial timber occurs. Plenty of slough grass but very little good hay was found. Fresh water was found in a branch of Berry creek, also alkaline water in sloughs. No water-powers are available. The climate is very similar to that at Calgary but there appears to be less rain. There is no fuel. No rock in situ suitable for building purposes was observed. No indication of minerals was seen. Antelope appear to be numerous, but feathered game was only occasionally seen.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 32.—From the town of Gleichen the trail to Hyde's crossing of Red Deer river was taken, and from here it was necessary to travel across country to the above-mentioned township. The soil is, generally third-class, being of a tough, clay gumbo. The surface is rolling prairie with coulées and a little scrub. No commercial timber occurs. Slough grass, but very little good hay is found. Good fresh water is found in a branch of Berry creek. No water-powers are available. The climate is very similar to that of Calgary. The only fuel in the township is a few dry willows. No rock in situ suitable for building purposes was observed. There is no indication of minerals. Antelope appear to be numerous; feathered game was only occasionally seen.—*A. W. Ponton, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 33.—I found the most convenient route for reaching this township was by trail from Ponoka. The trail is in good condition and passes about 25 miles north. The soil is chiefly heavy clay, producing fairly good grass, and would be suitable for grain growing, but not so desirable as a warmer soil. The surface is open prairie, mostly rolling. There is no timber of any kind. There are no hay marshes of any considerable extent. The only water at present obtainable is slough water slightly alkaline. No doubt good water could be obtained at a moderate depth by sinking wells. There were no frosts during the progress of my work. There are no stone quarries. No minerals were observed. The nearest fuel supply is at Sullivan lake, about 20 miles distant, where coal is to be had. Antelope were seen frequently. Duck and geese were numerous in the few sloughs and pools along the partially dry creek beds.—*George Edwards, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 34.—I found the most convenient route to this township was by trail from Ponoka. The trail is in good condition and passes about twenty miles north. Means of access will shortly be changed by railway construction now in progress, the branch line from Lacombe passing within 25 miles of this township. In the northern portion the soil is sand, with clay subsoil. In the southern half of the township the soil is heavy clay. I have classed it as third rate throughout. It is suitable for mixed farming, but not so desirable as a warmer soil. The surface is open rolling prairie with no timber, except a few small clumps of poplar and willows in the northern part of the township. There are no hay marshes of any note. There is one small lake with water which is muddy and alkaline. No doubt good water is to be had by sinking wells. No summer frosts occurred during the progress of my work. The nearest fuel supply is at Sullivan lake where coal is obtainable. There are no stone quarries. No minerals were observed. Game is not abundant. Antelope were seen occasionally. There are no settlers at present, but no doubt the land will be taken up when railway facilities provide the means of bringing in building materials.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 35.—I found the most convenient means of reaching this township was by trail from Ponoka. The trail passes about fifteen miles north of the township and is in fairly good condition. The soil is sand and clay, and fully three-fourths of the area is suitable for agricultural purposes. There is no timber, except a few clumps of small poplar and willows in the northwest corner of the township. There are no hay marshes of any considerable extent. Only one creek of good fresh water was seen. The water in three small lakes is muddy and alkaline. There being only one very small stream, there are no water-powers. There would not seem to be any special danger of summer frosts. There is no fuel nearer than Sullivan lake, where coal can be had at a point about ten miles distant from this township. There are no stone quarries. No minerals were observed. Prairie chicken, geese and duck were abundant. Badgers and foxes were seen occasionally. This land is not hilly enough to attract ranchers, but will come into use for mixed farming purposes, for which it is well adapted.—*George Edwards, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 59.—Two direct trails from Edmonton to Lake LaBiche pass through this township. The first, known as the south trail, crosses to the south of the Saskatchewan at Fort Saskatchewan and back to the north side at what is known as Pardee's crossing. This trail is in good condition the greater part of the year, and is considerably travelled. That known as the north trail follows along the north side of the river all the way from Edmonton to Lake LaBiche and passes through this township from east to west. This, however, is not a good trail and is seldom used at present. The soil in this township varies from black and sandy loam to a sandy clay, the clay for the most part having a clay subsoil while the sandy loam has a sandy subsoil, which in some places merges to a fine gravel. The centre and western parts are mostly light loam which is covered on the high land with a luxurious growth of grass and pea-vine and should be well adapted to general farming. The clay soil also bears a heavy growth of pea-vine and grass and although harder to work should be good farming land. The eastern part of the township is of a rolling and hilly nature, while the

6-7 EDWARD VII., A. 1907

western part is slightly rolling only. In the northern part of this township and more particularly along the shores of Bonnie lake there is a general growth of scrub. There are, however, and more especially in the western part, small patches of prairie, which have been occasioned by the country being repeatedly swept by fire. There is a great quantity of heavy slough grass along the banks of a creek, which flows through sections 7, 18, 17, 21, 22, 15 and 11 in this township, and there are several sloughs from which hay might be cut during the dry season. On the high land of the township there is a great quantity of pea-vine which could be cut in places with little trouble. All water in this township is fresh. There are a great number of permanent sloughs throughout the eastern part, while the creek traverses a number of sections. This creek is permanent, running water through sections 2 and 11, being fed from a large muskeg on sections 11, 14, 15, 21 and 22. The creek before entering this muskeg is not a permanent running stream, but large pools of water exist in it through the dry season. This creek bed is from twenty to forty links wide and from three to six feet deep. A number of springs exist along the southern shore of Bonnie lake, and from which flows the finest of water. The western part of this township, including parts of sections 18, 19, 20 and 17 is liable to be flooded during the wet season. The parts of sections 11, 14, 15, 21 and 22 which are muskeg are of course unfit for cultivation. The remainder of the township is apparently free from spring floods. No water-power exists. From general indications the climate is suitable to general western farming. No summer frosts are known to have occurred in this township during the season of 1905. Wood is the only fuel available in this township and this can be procured anywhere as there are great quantities of standing and fallen timber which have been killed by fires. No coal or lignite, stone quarries nor minerals of economic value are known to occur in this township. A number of moose were seen, also caribou and black bears are found here in small numbers. Lynx, foxes, coyotes, rabbits and ducks are found in considerable numbers. Prairie chickens and partridge are almost unknown. Whitefish and jackfish of good size and quality are found in Bonnie lake. —J. W. Tyrrell, D.L.S., 1905.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 60.—The two trails known as the south and north from Edmonton to Lake LaBiche join before reaching this township and cut off the southeast corner of it and then passes up the east side. Two branch trails from this were opened by me during the season 1905. One follows along the north of the township into section 33 and the other passes through sections 24, 23, 14, 11, 12 and rejoins the main trail in section 1. This last can only be used during the dry season or winter. To reach this township from Edmonton the best trail is that known as the south trail, which crosses to the south of Saskatchewan river at Fort Saskatchewan, and recrosses to the north at Pardee's crossing. This is considerably travelled and is in good condition most of the year. The soil is mostly made up of sandy clay loam or sandy clay, but a clay loam is found in some low lying spots. All have a clay or sandy clay subsoil. This soil although perhaps a little heavy to work should be splendidly suited to general western farming. The surface is completely covered with heavy timber or heavy growth of young bush and scrub. The north and western thirds are almost solid, heavy timber, while the southeastern portion is covered with a heavy second growth bush with scattered bluffs of heavy timber. There are very heavy windfalls covering nearly all that area on which the second growth exists. There are quite a number of small sloughs throughout this township from which slough grass of good quality may be cut, while on sections 28 and 14 there are hay sloughs of considerable size from which first-class hay may be obtained. On sections 14 and 11 there are also very large hay sloughs, but these would have to be drained before the hay could be cut. All water in this township is fresh. Good water can be obtained in any part of the town-

SESSIONAL PAPER No. 25b

ship at all times. Along the western and northern shores of Spring lake are found a great many springs from which flow the finest of water. Cache creek traverses sections 28, 23, 22, 14, 13 and 12. During the wet season this creek is fed from sloughs, in section 28, but the permanent source is a number of springs and muskegs in section 22. Below section 22 this is a permanent running stream which steadily increases in size as it is fed by numerous springs as well as by Little Beaver creek which joins it in Spring lake. After leaving Spring lake it is very sluggish in places, being wide and deep. Where it leaves the township it is about six feet wide and 18 inches deep with a current of about two miles an hour. Little Beaver creek has its source in Little Beaver lake. It is a permanent stream with an average width of 5 feet and depth of one foot and has no perceptible current. There would be very little flooding of any land here which is adapted to farming. No water-power is available. From general indications the climate here is suited to general farming. No summer frosts are known to have occurred during the season 1905. There is an almost unlimited quantity of splendid wood in this township at present, as there are great windfalls of burnt timber through the southeastern part. There is also a large quantity of dry timber to be found amongst the green timber. No coal or lignite, nor stone quarries, nor minerals of economic value are known to exist. A number of moose, caribou and black bears are found in this township. Large numbers of rabbits are also found and quite a number of lynx. Ducks were seen in considerable numbers, while partridge and prairie chicken were rarely seen.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 61.—The main trail from Edmonton to Lake LaBiche passes through the Indian reserve to the east of this township and follows quite closely the east shore of Goodfish lake. There are two trails leaving Edmonton for Lake LaBiche, and these join a few miles south of this township. That one known as the south trail which crosses to the south of Saskatchewan river at Fort Saskatchewan and recrosses to the north at Pardee's crossing is the one generally used. This trail is considerably travelled and is in good condition the greater part of the year. There are branch trails from the main trail which reached as far in as section 29, which were extended to reach the township to the west. The soil in this township varies from a very heavy clay to a sandy soil, including a clay loam and a good deal of sandy clay. The subsoil is principally a clay but a sandy subsoil is found in many places. The soil is well adapted to general farming, but the clay is rather heavy in places to be easily worked. The south two-thirds and westerly parts of the township are completely covered with heavy timber while in the northeastern parts the heavy timber is interspersed with clumps of scrub and second growth timber. A considerable quantity of good hay is cut by the Indians from a number of sloughs on sections 35, 26, 27, 28, 29 and 20. These are the only sections, however, from which any quantity could be cut. All water in this township is fresh and can be obtained in any part of it. A small creek traverses sections 6, 5, 4, 10, 11, 2, 1 and flows into Goodfish lake in section 12. Small pools exist throughout the dry season in the bed of this creek. A small creek has its source in section 32 which flows north into Whitefish lake. No streams exist from which water-power is available. From general indications the climate is well suited to western farming. Garden corn matured on the Indian reserve to the east of this township in the season of 1905. No summer frosts are known to have occurred during this season. Good wood can be gathered in any part of the township. No coal or lignite veins, stone quarries nor minerals of economic value occur. A few moose were seen and an occasional black bear is also found. Rabbits are very numerous, lynx are found in considerable numbers as well as coyotes. Partridges and prairie chicken are very scarce, duck are plentiful around Goodfish lake. Jackfish and whitefish are very plentiful in Goodfish lake.—*J. W. Tyrrell, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13.

Township 62.—This township, part of which is occupied by Indian reserve number 128, is directly on the route of the main trail leading from Victoria and Saddle Lake to Lake LaBiche, and which passes in a northerly direction through the eastern portion of the township. The soil varies from a black loam to a light clay subsoil, and may be classed generally, as number two. The surface is very much broken by the occurrence of Whitefish lake and two other small lakes. Toward the north and immediately joining the Lake LaBiche trail some rather extensive spots occur, but by far the greater part of the township is covered with poplar timber. In the northern portion of this township, especially along the valley of Whitefish creek, great quantities of natural hay occur. Water is everywhere abundant in this township. Indeed the greater part of the surface is covered with lakes, Whitefish lake alone occupying a great portion of sections 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 27, 28, 29 and 30. Other smaller lakes occur upon sections 3, 13 and 36 all of which are composed of fresh water and all well stocked with fish. No water-powers of any consequence occur. From general indications the climate is suited for mixed farming. No summer frosts are known to have occurred during the season of 1905. Abundance of fuel for all local improvements may be found in the shape of poplar and other varieties of timber. No coal or lignite veins stone quarries, nor minerals of economic value are known to exist in the township. A few moose, caribou and black bears were known to frequent the locality of this township. Rabbits were very numerous and several lynx were met with. Ducks were observed in considerable numbers, but grouse and prairie chickens were found to be very scarce.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 60.—This township, of which the eastern and part of the northern boundaries only, were run may be most conveniently reached by means of what is known as the Fort Victoria and Lake LaBiche trail, from which it is distant only about three miles. So far as known no roads are opened up directly to or through the township. The character of the soil along the east boundary of this township is chiefly that of a sandy clay with clay subsoil. Along the north boundary the soil varies from sandy loam to clay with clay subsoil, and might be considered as second-class. The surface of this township is well covered by a heavy growth of poplar timber with scattered spruce, tamarack, birch and jackpine. The character of timber found along the eastern and northern boundaries of this township consists of poplar, varying in diameter from four to twelve inches, as well as some spruce, tamarack, jackpine and birch, which are also found varying from about four to eight inches in diameter, but poplar is the predominating wood, which together with the other varieties mentioned, forms an amply supply of fuel, as well as building timber for local requirements. The country being largely covered with forest, hay is comparatively scarce, but is found upon sections 24 and 25 about the shores of a small lake and slough. As is usual in a wooded country water is comparatively abundant. A nice fresh lake occurs on the east boundary of section 25, a fresh slough on the east boundary of section 24, and a fresh creek crosses the north boundary of sections 36 and 33. No water-powers are known. From general indications the climate of this locality is suited to mixed farming. No summer frosts are known to have occurred during the season of 1905. There is abundance of good wood, well suited for fuel purposes. No coal or lignite veins, nor stone quarries are known to exist in this township. A few moose, caribou and black bears are known to frequent this locality. Rabbits are very numerous and several lynx were met with. Ducks were observed in considerable numbers,

SESSIONAL PAPER No. 25b

but grouse and prairie chickens were found to be very scarce. No minerals of economic value were discovered.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 61.—The main trail from Edmonton to Lake LaBiche passes several miles to the east of this township, but a branch reaches as far west as section 21 from which a pack trail branches in section 15 and goes westward across the township, while another pack trail crosses the northwest part of the township. The best trail from Edmonton to Lake LaBiche is that one commonly known as the south trail. This is joined a few miles to the southeast of the township, by the one known as the north trail. The south trail is considerably used and is in good condition most of the year. The branch trail into this township being new is rough in places. The soil generally is clay, but some sandy clay is also found and in the deep hollows a black muck, consisting mostly of decayed vegetation. Considerable swamp of a muskeg nature occurs here. The soil on the high land is nearly all underlaid with a clay subsoil. The high lands of this township should be splendidly suited for western farming. Some of the heavy clay, however, will be rather stiff to work. The country is rolling and is completely covered with heavy timber. No scrub or prairie country was seen. A hay meadow of considerable size is located on the north part of section 34, but no other meadows of any value were seen. All water found is fresh and the supply is sufficient and permanent. A small stream crosses the southeast corner of section 1, which is apparently a permanent running stream, being fed by small springs and muskegs. It is, however, very small and of little consequence. The swamps are wet throughout the entire season, but apart from this the township should be little liable to floods. No streams in this township could be utilized for water-power. From general indications the climate is well suited to farming. No summer frosts are known to occur. Wood is the most reliable fuel and this is at hand everywhere. No lignite, coal nor stone quarries are known to occur, nor minerals of economic value. Rabbits are very plentiful, while lynx, coyotes, foxes and some smaller fur-bearing animals are found, but large game is very scarce. Partridge and prairie chickens are almost unknown and only a limited number of ducks were seen.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 62.—From Whitefish lake there is a good pack trail crossing this township from east to west. The soil is generally of a sandy clay and is rather poor, except a few patches here and there. It is suitable for mixed farming. The country is rolling with a few broken sections adjoining Whitefish lake. It is wooded, but there is no marketable timber. There is no hay. Whitefish lake touches this township at sections 24 and 25, and there are two or three permanent lakes, one on section 19 and the other on section 4, besides several small creeks. No land is liable to be flooded. There are no waterfalls and no water-power can be developed. The climate is good and will be free from summer frosts, being near a pretty large sheet of water. There is any quantity of fuel on every section, but there is no lignite. There are no quarries. There is no mineral of economic value in this township. Moose and bears are plentiful.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 62.—This township may be most easily reached from the Lake LaBiche trail, which passes along the eastern shore of Whitefish lake and enters township 61,
25b—19½

6-7 EDWARD VII., A. 1907

about two miles from the southeast corner of township 62, range 14. The soil along the east boundary is that of sandy clay with clay subsoil and may be termed second-class. The surface of the eastern part of this township is comparatively rough and broken, due to the proximity of Whitefish lake, but is entirely covered by a heavy growth of poplar timber with occasional spruce, tamarack and birch. Willow and hazel scrub are found in the valleys adjoining the lake shore. The predominating timber upon the eastern section of this township is that of white poplar varying in size from about four to ten inches. A few spruce were observed of diameters from eight to sixteen inches and a few birch of from four to ten inches in diameter were also noted. Little or no hay was observed along the east boundary of this township. Abundance of fresh water occurs along the east boundary, not only in the body of Whitefish lake, but also in the numerous small tributary creeks discharging into it. No water-power of any consequence occurs. From general indications the climate of this locality is suited for mixed farming. No summer frosts are known to have occurred during the season of 1905. Abundance of fuel for local requirements may be found in the shape of poplar and other varieties of timber. No coal or lignite veins, stone quarries, nor minerals of economic value are known in the township. A few moose, caribou and black bears were known to exist in this township. Rabbits were very numerous and several lynx were met with. Ducks were observed in considerable numbers but grouse and prairie chicken were found to be very scarce.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 63.—This township may be most easily reached by means of a branch trail from the main road to Lake LaBiche, which forks to the westward immediately north of Whitefish lake. The soil of this township is chiefly of a sandy clay with clay subsoil and may be termed second-class. The surface of the country along the east boundary of this township is entirely covered by a forest of poplar, spruce, tamarack and white birch. The predominating timber of this locality is white poplar, although spruce of from three to ten inches in diameter was observed. In some places white birch and a few jackpine were also noted, varying in diameter from three to ten inches. Some natural hay was found to occur along the east boundary of section 12, but otherwise the country was found to be too heavily wooded to admit of the growth of natural hay. Beaver river crosses the east boundary of section 25 and forms the chief water supply along the boundary of this township. No water-power of any consequence was found in this township. From general indications the climate of this locality is suited for mixed farming. No summer frosts are known to have occurred during the season of 1905. Abundance of fuel for all local requirements may be found in the shape of poplar and other varieties of timber. No coal nor lignite veins were found. No stone quarries nor minerals of economic value were discovered. A few moose, caribou and black bear were known to exist in the locality of this township. Rabbits were very numerous and several lynx were met with. Ducks were observed in considerable numbers, but grouse and prairie chicken were found to be very scarce.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14.

Township 64.—This township, the eastern boundary only of which was run by me, is most easily approached by the Lake LaBiche trail, from which it is distant about six miles to the westward. The soil along the east boundary of this township varies from light sandy loam to clay with clay subsoil and appears to be suited for general farming purposes. The entire surface of the country along the east boundary of this township is covered by a heavy forest of poplar, spruce, tamarack and white birch, and

SESSIONAL PAPER No. 25b

is somewhat broken by the valleys of Little Beaver river, on section 36, and a small lake on section 1. The timber along this boundary is decidedly above the average of the district in both quantity and quality, the percentage of mill timber being much greater than usual. Spruce and tamarack of exceptionally fine quality were found upon section 13, some trees in this locality were observed as large as twenty-four inches in diameter. The surface of the country along the east boundary is too heavily timbered to admit of the growth of much natural hay and little was found. The country is well watered by Little Beaver river which crosses through sections 25, 24 and 13, and a fine fresh water lake upon section 1. No water-power of any consequence exists upon this township. From general indications the climate of this locality is suited for mixed farming. No summer frosts are known to have occurred during the season of 1905. Abundance of fuel for all local requirements may be found in the shape of poplar and other varieties of timber. No coal or lignite veins are known in the locality. No stone quarries and no minerals of economic value are known to exist in this township. A few moose, caribou and black bears are found in the locality. Rabbits were very numerous and several lynx were met with. Ducks were observed in considerable numbers, but grouse and prairie chicken were very scarce.—*J. W. Tyrrell, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 15.

Township 61.—From Edward post office, which is on section 27, township 59, range 16, there is a fairly good hay trail running in a northeasterly direction which can be followed for a few miles, and which leads to a rough wagon road opened by myself which approximately follows the easterly boundary of range 16 and turns east on section 7 to go to the centre of the township. The soil is rather poor, being a sandy clay. There is a large percentage of swamp land which is not fit for agricultural purposes but the balance must be suitable for mixed farming. There is no marketable timber. The country is generally rolling, covered with a thick growth of poplar and cottonwood and some scrubby spruce in the swamps. There is no hay. This township is well watered, there being eight permanent lakes and several small creeks, the largest of which crosses the east boundary of section 18. It is a stream about four feet wide and eighteen inches deep with a current of three miles an hour. No land is liable to be flooded. There is no water-power to be developed and no water-falls. The climate is good, there being no summer frosts. Fuel is plentiful on every section, but there are no lignite veins. There are no stone quarries and no minerals of any economic value. Bears and moose are to be found.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 15.

Township 62.—There are no good trails running through this township, and the best means of getting to it is as follows: Starting from Victoria settlement, thence along a good wagon trail to Edward post office, in section 27, township 59, range 16, west of the fourth meridian, which is almost the last of the good trail. From Edward post office there is a fairly good hay trail running in a northeasterly direction, which can be followed for a few miles, and which leads to a rough wagon road cut by myself which approximately follows the easterly boundary of range 16 as far as the northeast corner of section 12, township 62, range 16, from where it branches east and runs through the centre of township 62, range 15. The soil in this township is very poor, consisting for the most part of two or three inches of leafy mould over a grayish white sandy clay with coarse wash gravel at a depth of from eighteen inches to three feet, and does not appear to be suitable for any kind of farming. The surface is for the most part of a gently rolling nature, and all heavily wooded with poplar, cottonwood, spruce, tamarack, jackpine and thick underbrush; about eighty per cent of the bush

6-7 EDWARD VII., A. 1907

being poplar and cottonwood and fifteen per cent being spruce and tamarack, and the rest jackpine. The poplar and cottonwood will average from five inches to six inches in diameter as a rule, but there are trees up to twelve inches scattered all through the township which would make good building logs. The spruce and tamarack are for the most part small, but in places there are small patches of large timber suitable for milling purposes. The jackpine is scattered all over the township on sandy ridges and will average seven inches or eight inches in diameter but is usually too stunted to be of much value for anything but fuel. There is no hay. The water is all fresh and fairly plentiful, being furnished by seven fairly large and permanent lakes, and several small ponds. There are also three small creeks running through this township, the largest of which is fourteen feet wide, one foot deep with a current of two miles an hour. There is no means of generating any water-power. The climate is fair—but owing to the presence of a good deal of muskeg and spruce swamps, would be liable to summer frosts. Wood for fuel is obtained on every section, but no coal or lignite veins were found. There is no stone suitable for quarrying. No minerals of any value were found. Moose, bears and lynx are to be found, also partridge and duck.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Ranges 15 and 16.

Townships 63 and 64 (east boundaries).—There are only pack trails to reach these outlines from Whitefish lake. They follow Whitefish creek, thence along Beaver river, which crosses these townships in a southeasterly direction. The country along these lines is all covered with poplar and cottonwood with an occasional spruce swamp. Along the east boundary of section 25, township 64, range 15, there is a belt of commercial timber about forty chains wide. The soil is generally third-class with a patch of better land along the streams. There is some hay along Beaver river. Beaver river crosses the east boundary of section 36, township 64, range 16, and again on section 25, township 63, range 15. This river has an average width of about forty feet, is three feet deep and has a current of two miles an hour and permanent supply of good fresh water. The climate is good. There is plenty of fuel, but no lignite veins have been observed. There are no stone quarries. Moose are plentiful.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 16.

Township 60.—There are no good roads running through this township, and the best means of getting to it, is to start from Edward P.O., from which place there is a fairly good road as far as section 17 of this township. Beyond this there is no good road. The country is generally of a rolling or hilly nature. The soil consists as a general rule of from two to four inches of black loam over a sandy or a sandy and stony clay subsoil and is only partially fit for mixed farming. The township is thickly wooded with poplar, cottonwood, jackpine and willow brush. The poplar and cottonwood averages from four to five inches in diameter and the jackpine averages about eight inches in diameter. Along the large creek which flows through this township there are some bluffs of jackpine suitable for railroad ties, should the problem of transport be solved. There is no hay. There is a good supply of fresh water in a creek, which is twenty-five links wide, one and one-half to two feet deep, with a current of four miles an hour; it enters the township on section 36 to go out on section 31 and re-enters on section 30 to leave it again on section 4. There are also two permanent lakes, one called Bear lake, in sections 16 and 17, and the other in sections 14, 15 and 22. There is no land liable to be flooded. There are no water-falls or other means of developing water-power. The climate is excellent, and there was no sign of summer

SESSIONAL PAPER No. 25b

frost. Wood for fuel is obtainable on every section, but no coal has been discovered. There is no stone suitable for quarrying purposes and no minerals of any economic value have been discovered. Moose and bears are to be found.—*J. L. Côté, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 16.

Township 61.—There are no good trails running through this township. From Edward post office in section 27, township 59, range 16, there is a fairly good hay trail running northeasterly which leads to a rough wagon trail cut by myself which approximately follows the easterly boundary of range 16 to section 12, thence westerly across the centre of the township. The soil consists of three inches of black loam with a sandy subsoil and is generally of poor quality. The surface is gently rolling and is covered with a growth of poplar and cottonwood. There is no marketable timber. There is no hay. There are six permanent lakes and several small creeks. The supply is sufficient and permanent. There is no land liable to be flooded. There are no waterfalls and no power can be developed. The climate is good and there is no summer frost. There is any quantity of fuel on every section, but there is no lignite. There are no stone quarries and no minerals of economic value located in the township. Moose and bears are plentiful.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 16.

Township 62.—There is no good trail running through this township. From Edward post office in section 27, township 59, range 16, west of the fourth meridian, there is a fairly good hay trail running in a northeasterly direction which leads to a wagon road cut by myself and follows the east boundary of range 16 to section 24, township 62, thence to the centre of the township. The soil is generally sandy or mucky in spruce swamp and is of poor quality. The surface is generally rolling and is covered with a growth of poplar, spruce and jackpine. There is no marketable timber. There is no hay. There are fourteen permanent lakes and several small creeks. The supply of water is plentiful, but there is no land liable to be flooded. There are no waterfalls and no water-power can be developed. The climate is good, there being no summer frosts. There is a large quantity of fuel on every section. There are no lignite veins in the township. There are no stone quarries and no minerals of any economic value. Moose and bears are found.—*J. L. Côté, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 17.

Township 60.—The route for reaching this township is as follows: Leaving Pakan P.O. there is a fairly good wagon road as far as the southwest corner of the township, but from there on there are no good trails. The soil is a black loam averaging six inches in depth over a sandy or sandy clay subsoil, and part of this township is suitable for mixed farming purposes. The surface is generally rolling or hilly, and is thickly wooded with poplar, cottonwood, jackpine and willows. There are bluffs of jackpine in sections 18 and 19 averaging nine inches in diameter and suitable for railroad tie purposes. About fifteen tons of hay can be cut along White-earth river, in sections 6 and 7. This township is well watered by six permanent lakes, one in sections 2 and 11, another in section 13, another in section 22, another in section 18, another in sections 17 and 20 and the last in sections 14, 23 and 26; also by White-earth river, which crosses sections 5, 6 and 7 and is a stream averaging seventy-five links in width, by two and one-half feet in depth, with a current of two miles an hour. All the water in this township is fresh and no land is liable to be flooded. There

6-7 EDWARD VII., A. 1907

are no waterfalls or other means of generating water-power. The climate is good and there are no signs of summer frosts. Wood for fuel can be obtained on every section, but there is no coal or lignite. There is no stone for quarrying purposes. No minerals of any economic value have been discovered. Moose, deer and bears are to be found.—*J. L. Côté, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 18.

Township 60.—The route for reaching this township is as follows: Leaving Pagan P.O. there is a fairly good road as far as the southeast corner of this township, but beyond that there are no good trails. The soil is a black loam averaging five inches in depth over a sandy or sandy clay subsoil. Part of this township is suitable for mixed farming purposes. The surface is undulating or rolling and is thickly wooded with poplar, cottonwood, spruce and tamarack and jackpine. The poplar, cottonwood, spruce and tamarack averages about five inches in diameter and the jackpine averages about ten inches in diameter. There is some hay along the valley of White-earth river, probably from fifteen to twenty tons could be cut. The east one-third of this township is well watered by a lake in section 35, and by White-earth river, which flows through sections 36, 25, 24, 13 and 12. White-earth river is a stream of seventy-five links in width, two and one-half feet in depth and with a current of two miles an hour. All the water is fresh and no land is liable to be flooded. There are no waterfalls or other means of generating water-power. The climate is good and there are no signs of summer frosts. Wood for fuel can be obtained on every section, but there is no coal or lignite. There is no stone for quarrying purposes. No minerals of any economic value have been discovered. Moose, deer and bears are to be found.—*J. L. Côté, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 20.

Township 56.—The road from Fort Saskatchewan to Star passes along the south boundary of this township and is well settled on either side. Bruderheim post office is situated on the north boundary of section 33, township 55, range 20, and has a large store in connection with it. The surface of the township is slightly rolling and the soil on the south and east part of it is black loam, but the northwest part of the township is sandy hills or tamarack swamp and will never be worth much either for farming or anything else.—*G. J. Lonergan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 21.

Township 32.—This township is reached by a good travelled trail, running from Red Deer or Lacombe, stations on the Calgary and Edmonton railway, easterly to the junction of Tail creek with Red Deer river, thence southerly. The soil is a clay loam, with a clay or gumbo subsoil of poor quality, is unsuitable for agricultural pursuits and is only suitable for ranching purposes. The surface is rolling prairie. The westerly half of the township is very much broken by the valley of Red Deer river, which runs southerly from section 31 to section 5, and has several large and deep ravines running to the river. The valley is from four hundred to five hundred feet deep and about a mile wide. There is no timber in the township, save a small quantity of small spruce and poplar along the river banks, and in some of the deep coulées. There is no hay in this township. The only water is Red Deer river, and is difficult to obtain. The remainder of the township is very dry. There are no falls, rapids or water-powers in this township. Fuel is scarce; small quantities of wood are found in the coulées. No coal deposits were found. There are no stone quarries nor minerals. No game of any kind was found in the township.—*Joseph A. Carbert, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 21.

Township 33.—This township is reached by a good trail running easterly from Red Deer or Lacombe stations on the Calgary and Edmonton railway, to the junction of Tail creek with Red Deer river, thence southerly. The soil in the western row of sections is of a gumbo nature, in the remainder of the township it is a sandy loam, with clay loam subsoil, and ranks second and third-class. The surface is rolling prairie with scattered bluffs of small poplars and willows, also ponds and lakelets fringed with brush. There is no timber. Hay is found on the uplands in considerable quantities. The only water available is in the ponds, sloughs and lakelets, and is of fair quality. There are no water-powers, rapids nor falls in the township. No stone quarries nor minerals were observed. No game was seen. The Red Deer crosses the township in section number 6.—*Joseph A. Carbert, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 21.

Township 34.—This township is reached by a good travelled road which runs easterly from Red Deer and Lacombe, stations on the Calgary and Edmonton railway, to the junction of Tail creek with Red Deer river, thence southerly. The soil is a sandy loam, with considerable gravel and gumbo for subsoil, and ranks as second and third-class. This township is better adapted for ranching than for farming. A few good tracts occur throughout the township. The surface is rolling prairie, broken up by Red Deer river, which runs through the northwesterly portion of the township, also by a deep coulée, which runs across the middle of the township to the river. No timber of any account was found in the township. Small poplar and balm of Gilead are found along the river banks. Considerable upland hay occurs throughout the township. The only good water is found in Red Deer river, and in the coulée running through the middle of the township. There are no water-powers, falls nor rapids in the district. Fuel is scarce. No coal deposits, stone quarries nor minerals were found in the township. Antelope were the only game seen.—*Joseph A. Carbert, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 21.

Township 35.—The westerly half of this township is reached by a good trail from Red Deer, a station on the Calgary and Edmonton railway. The easterly half is reached by a good trail from Red Deer or Lacombe, which runs easterly to the junction of Tail creek with Red Deer river, thence southerly. The soil is a black sandy loam, and ranks second-class; it is suitable for agriculture and mixed farming. The surface is rolling prairie, broken by the valley of Red Deer river which nearly divides the township in halves, flowing from section 32 to sections 2 and 3, in a valley from four hundred to five hundred feet deep. The portion east of the river valley is rough and hilly with numerous ponds, sloughs and bluffs of small poplar timber. A considerable quantity of spruce ten inches to twelve inches in diameter, balm of Gilead eight inches to ten inches and poplar four inches to eight inches, is found along the river banks and in the coulées running to the river. A moderate quantity of upland hay is found through the township. Abundance of good water is found in Red Deer river, and in the numerous ponds through the township. There are no water-powers, falls or rapids. Coal is obtained in small quantities in some of the ravines running to the Red Deer. Wood is found among the dead timber along the banks of the river. There are no stone quarries nor minerals.—*Joseph A. Carbert, D.L.S., 1904.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 32.—This township can be reached by the Kneehill trail running easterly from Olds, a station on the Calgary and Edmonton railway. The soil is principally a clay loam and ranks second-class. It is suited for agricultural purposes. The surface is a heavy rolling prairie, with deep ravines in the eastern portion of the township running to the Red Deer. There is no timber in the township, save small patches of small spruce and poplar in the deep ravines running to the Red Deer. Considerable upland hay is found through the township, also around sloughs in sections 25, 26, 35 and 36. Ghostpine creek runs through the southwesterly portion of the township in sections 5, 6, 7, 18 and 19, and contains good water excepting in very dry seasons. A few sloughs in sections 25, 26, 35 and 36 contain water for cattle and horses. There are no water-powers, falls or rapids. There is no fuel in the township but coal is plentiful on the Ghostpine, in township 31, range 22. There are no stone quarries nor minerals. Antelope was the only game seen in the township.—*Joseph A. Carbert, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 33.—This township is reached by a good trail running easterly from Olds, a station on the Calgary and Edmonton railway. The soil is clay and clay loam, and ranks as second-class. A large portion of the township west of Red Deer river is suitable for mixed farming. That portion east of the river is gravelly soil and ranks as third-class. The surface is mostly rolling prairie. That part of the township through which the Red Deer flows is badly cut up with large ravines and steeply cut banks. The river valley was found by the aneroid barometer to be six hundred feet in depth. The trail crosses the river at a good ford in section 14. A considerable quantity of timber consisting of poplar, willow and small spruce was found along the river banks. Only a moderate amount of upland hay is to be found. Good fresh water is found in the Red Deer, but it is difficult to obtain on account of the steeply cut banks. The only other water is in the small streams in the ravines. Very few good sloughs are found in the township. The only fuel is the timber along the Red Deer and in the deep coulées. Coal can be had in township 31, range 22 south. No water-powers, falls nor rapids and no stone quarries nor economic minerals were discovered.—*Joseph A. Carbert, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 34.—This township is reached by a good, travelled trail running southeasterly from Red Deer, a station on the Calgary and Edmonton railway. The soil is a sandy loam clay, and the whole township ranks as second-class land and is good for agricultural purposes. The surface is heavy rolling prairie, with poplar bluffs having a gentle slope towards the southeast. There is no timber of any account, save the small quantities of poplar and spruce in the coulées, and along the river banks. The only hay is upland hay found in moderate quantities throughout the township. Good water is found in Red Deer river, and in the small streams running through the coulées to the Red Deer. The northerly half of the township has numerous small sloughs affording water for cattle. There are no water powers, falls or rapids. Coal is found on the banks of the Red Deer. There are no stone quarries nor minerals. No game of any kind was seen in this township.—*Joseph A. Carbert, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 58.—This township is reached in summer by the Athabaska Landing trail from Edmonton to the crossing of Redwater river, thence by a wagon trail going southeasterly along the north side of the river; and in winter, by a sleigh road from Sturgeon river bridge or Astleyville post office, across Lostpoint lake and a chain of swamps to the southwest corner of said township. Athabaska Landing trail is in fair condition, but the trail from the crossing of Redwater river is only a bush road. The soil in the western portion of the township is sand and most of it unfit for agricultural purposes. The eastern portion is sandy loam and suitable for mixed farming. The surface is rolling and covered with timber with the exception of some willow swamps, sloughs and muskegs. The west half of the township is mostly timbered with jackpine from six to eight inches in diameter with some spruce and tamarack along the river and edges of swamps, from eight to ten inches in diameter. There is considerable windfall along the south side of the river with willow and poplar brush. The southeast quarter of the township is rolling and covered to a great extent with willow brush and small poplar with scattered bluffs of larger poplar from six to eight inches in diameter and windfall. The northwest quarter of the township is undulating with some large muskegs or open swamps. There is green poplar from eight to ten inches in diameter, and spruce and tamarack six to eight inches in diameter around the swamps, as well as considerable windfall. There are small hay sloughs scattered all over the township, the grass being of good quality. Along Redwater river flats there is a heavy growth of coarse grass. The water is strongly alkaline, and the supply is not sufficient or permanent; the streams were all dry, or frozen to the bottom at the time of survey. The only land liable to be flooded is Redwater river flats, from fifteen to twenty chains wide. No water-powers occur. The climate is generally fine, being very dry last summer, with light frosts. Wood for fuel is available in any part of the township. A seam of coal about sixteen inches in depth and from five to ten feet under the surface was found on the north bank of the creek on sections 14 and 15. No stone quarries were seen. No minerals of economic value were found. Game consists of moose, small, deer partridges and rabbits.—*Hugh McGrandle, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 59.—This township is reached by the Athabaska Landing trail from Edmonton to the crossing of Redwater river, thence east across country. I did not see any travelled trail from the Landing trail to this township. Athabaska Landing trail is well travelled and in fair condition. The soil in the northeasterly half is a sandy loam with clay subsoil in places, suitable for mixed farming. The southwesterly half is mostly swamps and sloughs with ridges of poplar and jackpine and is only fit for hay lands. The surface is mostly level or undulating, and covered with timber and willow brush; in the northeasterly half of the township it is mostly poplar from four to eight inches in diameter, with some scattered spruce and tamarack and considerable windfall. The southwesterly half is timbered mostly with dead tamarack from four to eight inches in diameter, with poplar ridges and some green spruce, also jackpine from six to eight inches in diameter. There are a few spruce scattered all over the township from fifteen to twenty inches in diameter; also small hay sloughs or old beaver meadows, the grass being of good quality. Along the creek shown on sections 31, 32, 29, 20, 21, 17, 8, 5 and 4 there is a heavy growth of coarse grass. The soil in this half of the township is third and fourth-class. The water is strongly alkaline, and the supply not sufficient or permanent; the creeks and ponds were all dry at the time of survey, excepting the lake shown on section 7. Sections, 7, 8, 5, 4 and the northeast quarter of section 6 are liable to be flooded in wet seasons, but to no great

6-7 EDWARD VII., A. 1907

depth. There are no water-powers. The climate is good, being dry last summer, with light summer frosts. There is plenty of wood for fuel in any part of the township. No coal or lignite veins were found. No stone quarries occur. No minerals of economic value were seen. Game, consists of, moose, small deer, partridges and rabbits.—*Hugh McGrandle, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22.

Township 66.—The interior of the township is very rough and broken, being cut by the Athabaska river, Tawatinaw river, Muskeg creek and other small creeks. The whole of the township, with the exception of the muskegs, is covered with a heavy growth of poplar, willow and alder scrub, with scattered bluffs of poplar and odd poplar trees six to ten inches in diameter. The muskegs generally have a heavy growth of spruce and tamarac from six to eight inches in diameter. Two large lakes or sheets of water were found, one on the east side of sections 13 and 24 and one in sections 26 and 27. Both these bodies of water are surrounded with low marshy ground, have no permanent shores, and hence, were not traversed. A great quantity of hay is found around the lake in sections 26 and 27, but on account of the soft bottom very little can be cut in wet seasons. Athabaska river enters the township on the west side of section 30, cuts sections 30, 19, 20, 21, 28 and 33 and leaves the township in the northeast quarter of section 34. It is a very large stream twenty to thirty chains wide with strong current, sharp cut banks twenty to thirty feet high, with rough broken slopes from banks to uplands reaching a height of three hundred to three hundred and fifty feet above the river. The Hudson's Bay Company's reserve contains parts of sections 16, 17, 20 and 21, and river lots occupy parts of sections 17, 20, 21, 22, 27, 28, 33 and 34. The village of Athabaska Landing is situated on the Hudson's Bay Company's reserve. The main trail from Edmonton to the landing runs through sections 5, 8 and 17. Two pack trails from the landing lead to Baptiste lake, in the north part of township 66, range 24; one along the river, in section 19, and one through the north half of section 18. A pack trail from the landing to Lake LaBiche runs through the southeast quarter of the township. The two tiers of sections on the east side of the township are fairly level. Soil is light, classes three and four; only small patches throughout the township fit for cultivation. Water-power could be developed on Muskeg creek and on Tawatinaw river. The valley of Muskeg creek is such that a small power could be developed by a very moderate expenditure, and could be increased to two hundred or three hundred horse-power by a large expenditure, in building a dam. Tawatinaw river is not capable of being developed into more than a small power, not over fifty horse-power, without an expenditure far exceeding its worth. There are some boulders along Muskeg creek, Tawatinaw and Athabaska rivers. No stone quarries nor minerals of any kind. Game, nothing more than prairie chickens, rabbits and coyotes, which are not very plentiful. *Wm. R. Reilly, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 23.

Township 32.—This township can be readily reached by the Kneehill trail, running easterly from Olds, a station on the Calgary and Edmonton railway. The soil is mostly a black sandy loam and is good for agricultural purposes. The surface in the south portion is heavy rolling prairie; that in the north half is a hilly prairie. A plateau occupies parts of sections 21, 22, 23, 26, 27 and 28 and is good pasture land. There is no timber whatever in the township. Hay is not very plentiful. Ghostpine creek crosses the northeasterly portion of the township through sections 24, 25 and 36. It is about thirty links wide, and from two to three feet deep with a sluggish current.

SESSIONAL PAPER No. 25b

In dry seasons very little water is found in the creek. The water is fresh. A small stream runs easterly through the township, and empties into the Ghostpine. There are no water-powers, falls or rapids. There is no fuel in the township; coal is found in abundance in the townships lying to the south. There are no stone quarries nor minerals. Very little game was seen in this township. The south portion of the Three hills is situated in section 18.—*Joseph A. Carbert, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 23.

Township 58.—This township is easily reached by the Athabaska trail which passes along its west boundary and is in excellent condition, being the route used by freighters passing from Edmonton to Athabaska Landing. The two western tiers of sections extending from the north to south boundaries of the township are fairly clear and level but covered largely by small willows. This area has a sandy loam soil with clay as subsoil and is adapted for farming of any description. The remaining portion of the township is rough and broken by hills and swamps and is only suitable for pasture. The area first described is already well settled, principally by Galicians. No regular area of timber is to be found, but here and there patches averaging from 6 inches to 18 inches in diameter were seen, the largest area being along the south margin of a lake in the north part of the township. All the timber to be found would be required by the settlers to be manufactured into lumber or at present as the most convenient fuel. Hay is plentiful in this township being cut from the numerous sloughs which are found largely in the east part. The water on the whole is fresh and free from alkali coming from permanent springs. The only stream of any importance is Redwater river, flowing through the northeast corner of the township. This stream is very crooked and sluggish and is not suitable for power purposes. There are no minerals of economic value nor has coal been discovered, although it is probable that it will be found along Redwater river. Game is very plentiful, principally moose, deer, chicken and duck.—*A. E. Farncomb, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 23.

Township 59.—This township is easily reached by means of the trail to Athabaska Landing which crosses the western part near the boundary. This trail is in good condition, having bridges and culverts across all streams and creeks. The soil generally is a sandy loam with a clay subsoil suitable for mixed farming, although some parts have sand or gravel—only suitable for grazing. These conditions were found along the hills and ridges. The township generally might be called scrubby, although patches of fair timber, tamarack, spruce and jackpine, are found here and there but too scattered to form an estimate of quantity, but I would think that there is sufficient for the needs of the settlers. There are a large number of hay sloughs scattered through the township, but they would require to be drained before any large quantity of hay could be cut. The water generally is free from alkali and fed from permanent springs. The only stream of any importance being Redwater river, flowing through the southern portion of the township, its depth is two feet six inches, average width, thirty feet, current, about two miles an hour, with a flow of about eight thousand feet per minute. This river is confined by high banks so that no serious floods occur. There are no rapids, falls or available sites for water-power. Wood is the most available fuel at present although coal will no doubt be found along the banks of Redwater river. Game is very plentiful, chiefly moose, deer, duck and chicken.—*A. E. Farncomb, D.L.S., 1904.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 27.

Township 59.—One of the routes for reaching this township is by the Athabaska Landing trail to about township 59, range 24, and then west to range 26. The soil is generally a coat of black loam 5 to 10 inches thick over clay subsoil specially adapted for farming. The surface is fairly level, slightly rolling in some places, covered with willows and small poplars, a few of the latter reaching 6 to 8 inches diameter. There is a fringe of fine spruce along the stream running through sections 26 and 35 and a few good spruce in the swamp or line of swamps running across sections 25, 26 and 27. Pea-vine is found all over the township, which in fact, is one of the best grazing grounds which I have seen. There are a few hay marshes, but of little extent, except around a small lake on section 27, but pea-vine and upland hay is plentiful. The water is good wherever met with, but it is scarce. However, wells have been dug by a few of the settlers and these give a bountiful supply of good water. The only important stream is the one running north on sections 26 and 35. It measures about 40 feet from bank to bank, with about 20 feet across the water, which averages 1 to 3 feet deep. The current is rather slow. Cleared of the fallen timber which lies across this stream logs could easily be driven down to the Pembina. Pike are numerous in this stream. There are no water-powers. The climate is the same as in Edmonton. The only fuel now available is wood, of which there is not a great quantity fit for the purpose. There are no stone quarries nor minerals of any kind that I know of. I saw no game in this township.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 27.

Township 60.—There are three or four roads leading to this township. The mail route is along the trail to Athabaska Landing to about township 59, range 24, then west to Edison, in range 26, and thence along the south outline of the township to range 27. The most travelled road is from Morinville northwest to Edison, which is situated on section 2, township 60, range 26. The soil is generally a coat of black loam five to ten inches deep over a clay subsoil, excellent for farming. The north and northwestern part is rather swampy and not all the area of the sections is fit for farming. The surface is fairly level or slightly rolling. It is covered by willows and small poplars with clumps of the latter varying from eight to ten inches in diameter. There are a few good spruce along the creek entering into the township on section 2, but the swamps contain only small spruce. Very little merchantable timber is to be found anywhere in the country. The water is good wherever found but is scarce. Pike are found in some of the streams. There are no water-powers. The climate is the same as in Edmonton. The only fuel now available is wood which is not plentiful nor of the best kind, although sufficient to supply the wants of the people for a few years to come. No stone fit for building purposes nor minerals of any kind were noticed.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 28.

Township 35.—In this township the town of Innisfail is situated in the northwest quarter. The surface is slightly rolling and had a good sandy loam soil. All the land is taken and about seventy per cent is under cultivation. A good graded road is around every two sections, and there are four schools that have a large attendance of children.—*G. J. Lonergan, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 28.

Township 37 and 38.—These townships are slightly rolling and have a good black loam and a sandy loam soil, and being so near the town all land is taken up. At Greenlaw, the Indian industrial school is built on section 12, township 38, where some two hundred Indian children are given a liberal education and taught scientific farming. The townships are well watered by Red Deer river and Cygnet lake, with numerous creeks. The settlers have good soft water wells at a depth of from twelve to twenty feet.—*G. J. Lonergan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 29.

Township 13.—A well travelled government road leads from Macleod to Lyndon post office which is within one mile of the south boundary of the township. A road from the township of Claresholm leads into the north end of the township by way of Willow creek. The soil is generally second-class. The high ridges are composed of either stony or gravelly clay; any top soil of loam, where it exists, is very shallow. In the extensive valleys lying between the ridges, the soil is a rich black loam, but seldom exceeds six inches in depth; the subsoil is a stony clay. This township is particularly adapted for ranching purposes, as the grass is luxuriant and shelter for animals is afforded by valleys and deep ravines. The larger valleys are also well adapted for agricultural purposes. The surface is diversified by hills, valleys and ravines. The country is generally open, with clumps of willow bush on the northern slopes only of hills or valleys; these clumps are not general. The height of land between Lyndon creek on the south and Willow creek on the north is a well defined ridge of the Porcupine hills. The slope towards the south is short and steep, while the northern slope is long and generally gradual. Both north and south slopes are cut up by deep and extensive valleys. These valleys are well adapted to mixed farming. No timber of commercial value occurs, but timber suitable for fuel occurs on section six. Hay is cut wherever the surface of the land permits of a machine being employed. The haying season lasts from July to November and generally into December. Small permanent streams of water follow every ravine and valley and springs are abundant. Willow creek on the north and Lyndon creek on the south are permanent streams. Lyndon creek is not subject to bad floods; Willow creek, while subject to abnormal floods, is well confined between high banks. All water within the township is sweet. Willow creek furnishes opportunities for the development of water-powers, by the construction of dams. Each such scheme would require special study to overcome engineering difficulties. The climate is similar to that obtaining in southern Alberta generally. The temperature is perhaps a few degrees lower than in the prairie country, during the summer months, but the winter temperature is apparently the same. Frosts occur on the high ridges during the summer occasionally, but I have had no personal experience of summer frosts in the valleys. Fuel can only be obtained on section six, where poplar from four to ten inches in diameter, and some green and dry spruce and fir occurs. Many outcrops of sandstone occur, but until opened up, it is difficult to judge as to suitability for building purposes. No minerals were observed. Game of all kinds has disappeared; small rainbow trout can still be caught in Lyndon creek.—*A. W. Ponton, D.L.S., 1904.*

TOWNSHIP WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 13.—The shortest route into this township is from Stavely on the Calgary and Edmonton railway to the New Oxley ranch and then following the valley

6-7 EDWARD VII., A. 1907

of Willow creek to the northeast corner. The road is very hilly and the creek must be forded very frequently. The soil found in the extensive valleys, heading in the hills and leading north to Willow creek, is generally a deep black loam with stony clay subsoil. The ridges between the valleys are composed of glacial drift, which, although unsuited for agricultural purposes, furnishes rich grazing for cattle. The northern portion of the township is generally open, but patches of small poplar and willow occur in sheltered positions. The southern portion of the township is generally wooded with poplar, spruce, fir and jackpine, the latter, however, predominates. Some areas of timber of commercial value occur in the southwestern and unsubdivided portion of the township, but the nature of the country makes it very unapproachable. Spring creeks flow in the bottoms of all valleys, and the supply of water appears permanent. The only stream of considerable volume within the township is Willow creek, average width fifty feet, average depth three feet, average current three miles per hour. Flooding is of no consequence as the banks are high and well defined. Water-powers are available at many points, owing to the rapid fall of the stream. Each in itself calls for special consideration by a duly qualified engineer. The climate is similar to that which prevails in southern Alberta generally, but the high altitude increases chance of summer frosts, but for myself I have never experienced it. Fuel is plentiful as dry wood abounds in all directions in the south half of the township. No rock, in situ, was observed, but outcrops of sandstone occur in the southwest and unsubdivided portion. No trace of minerals was observed, although coal has been discovered elsewhere in the Porcupine hills country. Game is practically extinct, with the exception of a few partridge and trout. I am of opinion that the north half of this township is well suited for settlement, while the south half is only valuable as a timber reserve.—*A. W. Ponton, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 39.—This township is twelve miles west of the town of Blackfalds. The surface is rolling and the soil is good sandy loam, and almost every quarter section is taken. Snake lake in the southwest part has good water and is well stocked with whitefish and pike. It is patronized by the citizens of Red Deer as a summer resort and there are a few pretty cottages built along its banks.—*G. J. Lonergan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 58.—The most practicable route for reaching this township is by following the fifth meridian which is used not only by pack trains but is now cut out and used by wagons although in rather a rough state. A trail opened some years ago diagonally across the township from the southeast corner was re-opened by me last winter. The soil is very good although the surface on the whole is too rolling, but should be well adapted for mixed farming. The whole country in this vicinity was once heavily timbered, but has recently been burned and a new growth of scrub makes it almost impassable. There is no other timber of any value left but bluffs here and there will probably be sufficient for the settlers. Springs or running waters are very rare, but those found are free from alkali; all the creeks at time of survey were frozen to the bottom. The climate is good, being similar to that in northern Alberta. The only available fuel at present is wood which is found in large quantities in the dry state. There do not appear to be any stone, coal or minerals of economic value in this township. Game is not very plentiful owing to the severe fires, but deer are found in large numbers in the immediate vicinity as well as a few moose. There were no settlers located in this township although a number of parties were looking it over at the time of survey.—*A. E. Farncomb, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 59.—This township is now reached in three directions, from the east, by the road from Edison, following the chord between townships 59 and 60, from the southeast by a trail coming from Saunderson's mill where the trail from Morinville and Independence meet, and from the south by a road opened by settlers through township 58. Pembina river, a large stream three to five chains wide, cuts it on sections 31 and 32. This river which flows into the Athabaska is from two to four feet deep at low water and from ten to fifteen feet deep at high water during the spring floods. The soil is a rich black loam in most places, but sandy loam is met with in some parts. It is eminently suitable for farming. The surface is rolling, almost hilly, towards the south part, with no prairie or very small spots of it, and is covered with a new growth of small poplar and willows, easily cleared. On sections 36, 17, 16, 9 and 10 there is heavy bush. As just stated the township is covered mostly with small poplar and brush, but there is a large island of heavy spruce on sections 9, 10, 16 and 17, with fine spruce measuring as much as thirty inches in diameter and sound. There is also a certain amount of spruce on section 36 in the northwest corner. The sections or quarter sections containing this spruce would make a good timber reserve for the use of the settlers. There are not many hay sloughs in this township and only one lake of any consequence. The water is good but not plentiful. Wells, if dug, would no doubt supply all the water wanted. Outside of the Pembina there are only small streams, and as a consequence no water-powers. No signs of coal nor any other minerals were noticed, nor do any stone quarries exist. The climate is the same as in Edmonton and there were no summer frosts during the summer. Chickens, a few partridges, rabbits, and once in a while a deer or a moose were the only game seen. Pike of good size were fished from the river.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 60.—This township can be reached by going through River Qui-Barre around by Independence and then north to the chord between townships 59 and 60. Most of the settlers, however, travel by Morinville and some follow the Athabaska trail farther than Morinville turning west somewhere on township 59. The main feature of this township is Pembina river, which crosses it nearly diagonally. It is a stream flowing northeast, three to five chains wide, and two to four feet deep at low water. In July and August, it was from four to ten feet deep. The bottom is soft in most places. Another feature are the lakes, most of which appear to have been at one time the bed of the Pembina itself. The soil is a fair coat of black loam over a clay subsoil, and the fact that quite a number of the sections are occupied shows that farming is going to be the main industry of the country. The surface is fairly level, gently rolling in some places, and covered with small poplar and willow brush, but good spruce is found along the Pembina, especially on the southwest quarter of section 6, and on sections 9 and 8, between the lake and the river. The banks of the river are nearly all through covered with a thick growth of large cottonwood from twelve to thirty inches and even more in diameter. On the west side of the river there is a large swamp or rather succession of swamps, growing scrubby spruce of little value and which leaves very little good farming ground in sections 17, 18, 19, 20, 21, 27 and especially on sections 28, 29, 32, 33 and 34 which are thereby rendered very undesirable for settlement. This ground might be reserved either as timber land, for the use of settlers or for the conservation of the water supply. Besides this large swamp, there are smaller ones all over the township, where a few spruce grow, but they do not affect to any extent the value of the land for farming purposes. Water in dry years will

6-7 EDWARD VII., A. 1907

not be plentiful, but wells giving a good supply, have been dug by settlers. Water-powers might be developed along the Pembina, but there are few rapids of any consequence. There were no summer frosts, during the season of survey, and the winter was mild with little snow. March was the coldest month of the year. The only fuel is wood, and for a few years to come it can be procured in the dry spruce swamps which exist in the township; however, it will not be many years before the supply will be exhausted. No evidence of coal, nor of stones of any value, nor of the existence of any other minerals was seen. Game is not plentiful, chicken, a few partridge, rabbit and occasionally a deer, supply all the game. Pickerel and pike are plentiful in the Pembina.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 73.—In this township the line runs through a gently rolling country, covered with a thick growth of poplar and spruce, and here and there a few jackpine and willow. In section 1 the poplar has attained a diameter of eighteen inches, but the timber is smaller; a number of muskegs covered with small spruce are met with. Leaving Peter lake in section 1 the line crosses Moose lake in section 12 and Howard lake in section 25; the water in all is good, though the banks or shores are low and marshy, except parts of the shores of Moose lake which are stony. Moose river flows westerly out of the west end of Moose lake and empties into Lesser Slave river. Moose lake is long and narrow, about fifteen miles long, three miles of it being west of the line, and containing trout and whitefish in abundance. The soil is mostly a clay subsoil with black loam varying in depth from one inch to eighteen inches.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 74.—The line continues through gently rolling country covered with poplar and spruce, which in places reach a diameter of twelve inches. A few birch and willow are also met with; forest fires had burned across the line in section 24 a short time before the line was run, killing most of the timber. A small creek of good water crosses the line twice in section 12, flowing from the north across sections 24 and 13. The soil is generally black loam on sandy subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 75.—The country as seen from the line is gently rolling with a general ascent towards the north in section 25, and from there, a gradual descent to the north. Section 1 is largely a spruce muskeg lately burnt over; north of this the timber is poplar, spruce and a few jackpine, ranging in size from four inches to fourteen inches, as far as the height of land where the timber grows smaller and more scattered, with a thick growth of alder and willow, and in section 36, thick spruce, and poplar and spruce muskeg, with a number of small streams of good water flowing in a westerly course, but most of these would probably be dry later in the season. The soil is generally black loam on clay and sandy subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 76 (north boundary).—Across this range the north boundary line runs over high rolling country covered with poplar, spruce and birch from three inches to

SESSIONAL PAPER No. 25b

ten inches in diameter, with thick alder brush in places. The land has a general descent towards the northwest. A wide valley can be seen to the north of the line some miles away, into which a number of streams of good water flow across the line; three especially, one in section 36 and two in section 33 appear to be permanent. The soil generally is black loam from two inches to ten inches on clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

Township 76 (east boundary).—For the first four miles the east boundary line passes chiefly through spruce muskeg with an occasional ridge of small poplar. Section 1 and 12 had recently been over-run by fire. The land in this four miles, descends towards the north and a number of small creeks cross the line flowing northeasterly. Sections 25 and 36 are hilly and broken and are covered with poplar, spruce, some birch and alder. A number of small creeks flow westerly in section 36. The soil is generally a black loam from two inches to ten inches in depth on a clay and sand subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2.

Township 13 (northeast part).—This township may be reached by a fair trail from Nanton, on the Calgary and Edmonton railway, distant about thirty-five miles. The soil in the bottom lands consists of a rich black loam, which, if climatic conditions would permit, should produce good crops. The surface, undulating and hilly, is partly prairie, more or less scrubby and partly timbered, the latter particularly in the hills. Some good fir is found in the hills on section 25 reaching twenty-four inches in diameter. There are no hay marshes, but there is a luxuriant growth of grass found on nearly all the uplands. The supply of water in the creeks appears to be unlimited, besides some springs on the hill sides. It is very fair and but little impregnated with alkali. No water-powers are available. With regard to the climate, reports are contradictory, as usual; ranchers maintaining that crops cannot be grown here, owing to the frequently recurring summer frosts; whereas the settlers, of whom there are quite a number, maintain that fall wheat and other crops can be raised here. For fuel there is yet a good supply of wood in the hills, such as poplar and other fire-killed timber. Coal too is found at no very great distance. There are no quarries, being operated, nor were minerals of any economic value observed. Game, such as deer, which at one time was plentiful, is being rapidly exterminated by the 'Stony Indians, who are in the habit of hunting to the west of this township and in the foothills in the early winter—and some of whom—a part of a large band—called at my camp, to dispose of some of the deer they had killed in the vicinity.—*C. F. Miles, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2.

Township 15.—This township is situated about twenty miles westerly from Nanton, a station on the Macleod extension of the Calgary and Edmonton railway, and may be reached by a fairly good wagon road. The soil consists principally of a black loam underlaid by a clay subsoil, frequently somewhat stony. It will raise any crops that the climate may permit. The surface is very hilly more particularly in the easterly half and mostly covered with a dense growth of willow, sometimes scrubby, sometimes of large dimensions, and second growth poplar. There are some areas of prairie in the northerly and westerly portions of the township more or less scrubby. There is some poplar in the southeast quarter of this township adapted for fuel or fencing. Any timber required for building purposes has to be brought from the foothills or mountains to the west. There are some hay meadows situated on sections 16 and 21,

6-7 EDWARD VII., A. 1907

but most of the hay used is cut on the uplands. It is well watered by spring creeks, containing good water, being the source of Stimson and Mosquito creeks, both of which, although not exceeding ten links in width, may be called permanent. Water-powers do not exist. With regard to the climate, I believe summer frosts prevail, and I doubt if crops could be raised here successfully and continuously. For fuel there is a supply of poplar and willow, which, if exhausted, would have to be replaced by coal or wood from the foothills or the mountains. There are no stone quarries in operation, although exposures of rock sandstone are frequently met with on the tops of the ridges. Minerals of economic value were observed. Not much game was seen, only an occasional deer or covey of chickens, the former are being rapidly exterminated by the roving bands of Stony Indians, who spend the early winter in this vicinity. In conclusion I may state that in my opinion this township is better adapted for cattle raising than for the tilling of the land.—*C. F. Miles, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2.

Township 46.—This township is traversed in a northwesterly direction by Battle lake and river. The former is three-quarters of a mile wide and five miles long. It is well stocked with whitefish, pike and perch. The banks of the river and lake are one hundred feet in height. The greater part of the land is rolling and covered with wind-falls, scattered spruce and poplar. The soil is clay and clay loam and if cleared would be a good farming district.—*G. J. Lonergan, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2.

Township 59.—The west part of the township is reached from Edmonton, partly by the Dawson trail and partly by a trail which in winter leaves the Dawson trail somewhere in township 58, range 3. In summer the trail mostly used to reach the western part, that is the part west of the Pembina, branches about a quarter of a mile from the north side of Paddle river. The eastern part, that is the part on the east side of Pembina river is reached by the settlers' trail, coming from the west and the southwest; the first running west from Edison and the other running northwest from Saunderson's mill on township 59, range 26. Pembina river, which meanders diagonally through the township, is the main topographical feature. It is a large stream four to five chains wide, about three feet deep in low water and from ten to fifteen at high water. The Paddle is about one chain wide and falls into the Pembina on section 16 after crossing sections 17 and 18 of the township. The soil is in general a coat of black loam six to twelve inches thick over clay subsoil. It is eminently suitable for farming. The surface is rolling and is covered with brush and poplar of good size in most places. The best timber stands along the river, where a good quantity of fine spruce is found together with large cottonwoods. There is all over the township, a good quantity of fair sized poplar and spruce, the latter mostly met in small swamps, although some grow on dry land. There is sufficient wood to answer the wants of settlers for a few years to come and if properly preserved and cared for, there is on every section enough of wood to provide all that is required for the wants of a farm. There are a few hay sloughs on the west side of the river, especially on section 7 where there is a large hay meadow. Water is good all over the township, but settlers away from the Pembina or the Paddle will have to depend mostly on wells for their supply. There are no water-powers though some might be developed along the Pembina or the Paddle by constructing dams. The climate is the same as in Edmonton. There were only about five or six inches of snow during the winter of 1905, and the weather was mild, except in March, when some very cold days occurred. Wood is the only fuel available. No marks of coal nor of any other minerals, nor any kinds of stones fit

SESSIONAL PAPER No. 25b

for building purposes were seen. Plenty of rabbits and lynx, a few partridge, mink and once in a while a deer or a moose are the only game. Of course coyotes abound and marks of bears were also seen.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2.

Township 76.—In this range the line passes over a very gently undulating country which has a slight general descent towards the north. Three large spruce muskegs occur in sections 36, 35 and 34. The remainder of the township is covered with poplar, spruce and birch from four inches to fourteen inches in diameter, the poplar largely predominating, and thick alder and willow brush in places. A number of small streams of water flow northerly across the line which are probably dry later in the season. The soil is black loam from four inches to twelve inches on clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3.

Township 6 and 7.—These parts are not adapted for agricultural purposes, being hilly and mountainous. They are situated within three miles of a railway, the Crow's Nest branch of the Canadian Pacific railway. Most of the timber has been fire-killed. Seams of bituminous coal have been discovered in various parts of these townships and several mines are in active operation. Other seams, it is anticipated will or may be found yet.—*C. F. Miles, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3.

Township 53.—The route for reaching this township is by the trail leading from Edmonton passing Sprucegrove, Stony plain and Mewassin, thence following the Lake St. Ann trail, which crosses the township in its southwest quarter. This trail is in good condition from its starting point to Mewassin and from here on although not graded it can be called a fairly good trail. The soil is a light sandy clay throughout and excepting the northwest quarter of the township where extensive swamps, muskegs and low lands prevail is well adapted for farming purposes. The surface for the most part is of an undulating nature. Nearly all this township has been overrun by fire, therefore its surface is covered with a second growth of small poplar and scrub. Whatever parts were spared by the devastating element are covered with poplar of eight inches in diameter and only suitable for settlers' purposes. No hay marshes of any extent are to be found in this township. In this locality water is free from alkali. Notwithstanding the excessive drought of the present season the numerous small creeks were giving a good supply of water. Owing to the absence of streams of any accountable flow no water-powers can be developed in this township. The climatic conditions are those generally prevailing in northern Alberta. Enough fire-killed timber is to be found throughout the township for fuel purposes. No coal, stone quarries nor minerals of economic value are to be found in this township. Duck and geese are plentiful in the few lakes of the locality. No traces of fur-bearing animals were noticed in this township, probably owing to the fact that it was overrun by fire—*Louis E. Fontaine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3.

Township 59.—The Dawson wagon trail, from Edmonton to the Athabaska, enters this township on section 3 and going mostly true north for five miles it crosses the

6-7 EDWARD VII., A. 1907

eastern boundary of section 33, then running northwest it leaves the township in the northwestern part of the section. The main feature of the locality is Paddle river, which runs nearly east across sections 18, 17, 20, 16, 15, 14 and 13, and empties into the Pembina, in township 59, range 2. It is a stream measuring from one to two chains wide, from two to four feet deep at low water, and from six to ten feet at high water. The Pembina crosses the township on section 1. The soil is generally a good coat of black loam over a clay subsoil and is well suited for farming purposes. The surface is rolling and almost completely covered with small poplar and brush with islands of larger poplar. In every section there are small swamps growing spruce, but the most of it was killed by fire last year, so that it will decay if not cut before long. In sections 12, 10, 6, 17 and 21 there is a quantity of spruce good for building purposes. These sections or parts of sections could be reserved for the wants of settlers or for the preservation of the water supply. Close to the road, especially north of the Paddle, is found the heaviest bush in the township and this mostly in sections 16, 21 and 28. It keeps settlers from going into the western part where the timber is light and the country better fitted for farming. The part east of the road is also a good country for settlement. Small patches of prairie are found in sections 22, 23 and 24. There are a few hay sloughs towards the southern part but they are not very large. The water is good where found, but away from Pembina and Paddle rivers the settlers would have to depend on wells for their supply. There are no water-powers, but some might be developed along the Paddle. The climate is the same as in Edmonton. Wood is the only fuel available, and if properly preserved would furnish a sufficient supply in the township for years to come. No stone quarries nor minerals were discovered. Mink, lynx, rabbit, a few partridge, and occasional deer or moose were the only game seen. Pike of considerable size were caught in Paddle river.—*Geo. P. Roy, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3.

Township 76.—Similar to range 2. A small lake is seen to the north in section 4, township 77.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4.

Township 44.—The best route for reaching this township is westerly from Lacombe following the road allowances and road diversions. They are in good condition during the whole of the year with the exception of the spring of the year when they are practically impassable. The soil consists of black loam, black muck and clay, and might be adapted for agriculture after the country is opened and improved, there being a great many muskegs. The surface is entirely covered with small timber, second growth timber, willow scrub and windfall. The timber is not large enough for building purposes. There are no hay lands. There is a good supply of water in the numerous small streams, and no difficulty would be experienced in obtaining good water by digging. There are no lands liable to be flooded and there are no streams of sufficient size to develop water-powers. The climate is generally clear. However, there is always sufficient rainfall to mature crops. The summers are hot with temperatures from 70 to 90 degrees. There are frosts every month in the year. There is plenty of wood for fuel. There are no stone quarries nor material of any kind. The game consists of moose, caribou, deer, bear, rabbit, otter, mink, marten, porcupine, wolf, coyote, grouse, duck and geese.—*W. F. O'Hara, D.L.S., 1904.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4.

Township 48.—From Edmonton I went to Mewassin, in township 52, range 3, west of the fifth meridian, thence following settlers' roads through townships 51 and 50, range 3, and township 50, range 4, I reached this township. The soil consists, for the greater part of the township, of a layer a few inches thick of black loam, with a sandy clay or clay subsoil. Nearly one-half of the quarter sections are classified as No. 2. The land is fairly suitable for farming. The township is pretty well timbered throughout. The greater part has been swept by fire, and there is to be seen, in the burnt places, besides dry timber and an occasional windfall, only small poplar and willows. There are a few bunches of log spruce in the east boundaries of sections 31, 18, 20, 17 and 5, and in the north boundaries of sections 9, 11, 22 and 23. There are but few places where hay can be cut, and nowhere in great quantity. It is prairie hay and is found in sections 19, 20, 7, 8, 15 and 10, in small open spots, amongst burnt stumps. The principal and practically the only stream worth mentioning is Poplar river. Its average width is ninety links, and its depth two to three feet. The current is swift and the water is good. If it were cleared from the trees lying across, it could be used for driving logs at high water. Poplar river has no falls and therefore it could not easily be used as a water-power. We had cold days early in February. The thermometer registered 44 degrees and 50 degrees below. It must be about the same climate as Edmonton. Dry wood is plentiful. There is no coal known in the township. There are no stone quarries. No minerals were observed. Fresh tracks of deer were seen several times; partridge also were seen. There are no settlers in the township.—*Raoul Rinfret, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4.

Township 49.—From Edmonton I went to Mewassin in township 52, range 3, west of the fifth meridian, thence, following settlers' roads, through townships 51 and 50, range 3 and township 50, range 4, I reached this township. The soil consists of a layer of black loam a few inches thick, with a sandy clay subsoil and is good farming land. Nearly one-half of the homesteads belong to class 1. Fire has raged nearly all over the township, and in the places burnt, only small poplar and willow are seen amongst the dry trees and the windfalls. There are spots where the spruce is big enough for ten-inch logs. The greater part of section 34 and the western part of 35 are covered with nice spruce. There are a few small bunches of spruce in the township, but they are of no importance. In a few spots pretty big poplar is found, but not in large quantities, mixed with birch and spruce; such as along the east boundary of 36, range 5, and of 32, 33, 8, 5, 35, 23 and 14, range 4. The rest of the township may be considered as covered with small poplar and willows and dry timber. Hay can be cut on the southern part of section 34 and along the north boundary of section 12. There is no stream of importance. The outlet of Coyote lake runs water fit to drink. There are no water-powers. We had cold days early in February. The thermometer registered 44 and 50 degrees below. I have reason to think that the climate is about the same as Edmonton. Dry wood is plentiful. There is no coal known in the township. There are no stone quarries and no minerals. Fresh tracks of deer were seen several times. Partridge also were seen.—*Raoul Rinfret, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4.

Township 50.—The route for reaching this township is by the trail leading from Edmonton passing Sprucegrove, Stony plain and Mewassin, then, following the north side of Saskatchewan river and across the township in a southwesterly direction. This

6-7 EDWARD VII., A. 1907

trail is in good condition from its starting point to Mewassin and from here on it is used only as a means of communication for the different shanties along the river, therefore the part traversing this township is far from being in good order. The soil is heavy clay throughout. The flats on the north side of Saskatchewan river, together with sections 5 and 6 would be well adapted for settlement. The remainder of the township, owing to the roughness of the ground, would at the present time offer no great inducements to settlers on account of the better conditions existing in the adjoining townships. The surface of the flats on the north side of the river together with sections 5 and 6 are covered with small poplar and brush alternating with small open patches of prairie. The remainder is heavily timbered throughout with poplar, spruce and cottonwood of a diameter of ten, fifteen and twenty inches, respectively. Lumbering operations have been carried on throughout the township, and during the course of the winter the licensee proposes to cut the remainder of the merchantable timber. No hay marshes of any account are to be found in this township. In this locality the water is free from alkali. Owing to the excessive drought during this season a good number of the small streams were dry. Saskatchewan river meanders on sections 15, 16, 17, 18, 21, 22, 23, 25 and 26 and flows amongst numerous islands and gravel bars. At low water it can be forded in several places. No water-powers can be developed in the township owing to the instability of the water supply. The climatic conditions are those generally prevailing in northern Alberta. Owing to the timbered nature of the locality fuel is everywhere obtainable. A good coal vein is reported to exist in this township, but no traces of it were seen during the survey. No stone quarries exist. Gold is to be found amongst the numerous gravel bars of Saskatchewan river, and owing to excessive low water prevailing this year miners have at times made good finds. Geese and duck are in abundance on the river at the migration season. Fur-bearing animals, such as mink and lynx were plentiful.—*Louis E. Fontaine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4.

Township 76.—The land in this range is gently undulating with a slight ascent to the west in the last two miles. The line crosses a number of small spruce muskegs in the first two miles, with low ridges of poplar, spruce and birch between them. The next three miles is thickly timbered with poplar, spruce and birch from four inches to twelve inches in diameter, poplar predominating. The last mile of this range is heavily timbered with spruce from six inches to thirty-three inches in diameter and birch, poplar and balsam from two inches to fourteen inches. In this section spruce predominates. Good water was found in a number of small creeks which cross the line towards the north. The soil on the west part of sections 34 and 33 and the east half of section 32 is mainly gravel. The remainder of the township is black loam on clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5.

Township 35.—From the town of Olds, Alberta, the eighth base line was followed for fifteen miles to Eagle Hills post office; a local trail then turns northwest and leads to Red Deer river a short distance above its confluence with James river, and near the corner between townships 34 and 35, ranges 4 and 5, west of the fifth meridian. Red Deer river is here forded, and the valley of James river followed west until section 16, township 34, range 5 is reached. A settler, Albert Wilcox, has a road from this section leading into township 35, range 5, west of the fifth meridian. The soil is generally clay and the top soil appears to have been almost entirely removed by forest fires. An extensive valley extends from the south boundary in a northwesterly direction

SESSIONAL PAPER No. 25b

through sections 1, 2, south half 11, 10 and northeast quarter section 9 and southeast quarter section 16. This valley is fairly open, and numerous small hay swamps occur. The bush found in this valley is scattered poplar, with much willow and bastard birch. The surface in the southwest portion of the township is from rolling to hilly, with numerous small lakes or ponds. The northeastern portion as well as the northwest corner is generally undulating. No timber of commercial value occurs, but building logs of good dimensions can be obtained in all directions. About fifty tons of hay can be obtained in the valley referred to above. A small quantity of hay is available in section 31. A fine spring is located on the southeast quarter of section 2, which quarter has been filed on by a settler, Luke Aldrich. Water is scarce in this township and is only found in muskegs and ponds. No water-powers are available. The climate is similar to that which obtains in other parts of northern Alberta. Summer frosts are usual. Fuel is plentiful, dry fallen timber is available in all directions. No rock in situ was observed. No signs of minerals were observed. Grouse, partridge and rabbits are numerous. Bears and deer are frequently obtained by Indians.—A. W. Ponton, D.L.S., 1904.

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5.

Township 42.—The best route for reaching this township is westerly from Lacombe, following the road allowances and road diversions. They are in good condition during the whole of the year with the exception of the spring months, when they are practically impassable. The soil consists principally of a good strata of black loam with a clay subsoil, and is well adapted for agriculture. The surface is entirely covered with poplar, spruce, tamarack, jackpine and scrub mixed. The timber is of fair size and will meet the requirements of settlers. There are no hay lands. There is a bountiful supply of fresh water at all times, and no difficulty would be experienced in obtaining good water by digging. There are a number of small streams flowing easterly into Medicine river averaging from five to fifteen feet wide and from three to five feet deep with good currents and fairly large volumes of water. There are a few sections which are low and liable to be flooded to a depth of six inches. None of these streams are of sufficient size to develop water-powers. The climate in the summer is generally clear, but there is always plenty of rain to mature crops. The temperature averages from 70 to 90 degrees. Frosts occur in every month of the year. There is plenty of wood for fuel. There are no stone quarries no minerals of any kind. The game found consists of moose, caribou, deer, bears, rabbits, otter, mink, marten, muskrat, porcupine, wolf, coyote, lynx, grouse, duck and geese.—W. F. O'Hara, D.L.S., 1905.

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5.

Township 43.—The best route for reaching this township is westerly from Lacombe, following the road allowances and road diversions. They are in good condition during the whole of the year, with the exception of the spring months, when they are practically impassable. The soil consists of black loam with a clay subsoil and is well adapted for agriculture. The surface is entirely covered with small timber, brush, dead timber and windfall. The timber may be large enough in a few places for building purposes. There are no hay lands. There is a bountiful supply of fresh water at all times. A large branch of Medicine river, fed by three lakes, flows southeasterly across the township. Its average size would be about thirty feet wide and ten feet deep, but the volume of water is not great enough to afford water-power. The climate is generally clear, however, there is always plenty of rain to mature crops. The summers are hot with temperatures of 70 to 90 degrees. There are frosts every month of the year, but they would likely disappear after the country is opened. There is plenty of wood for fuel. There are no stone quarries nor

6-7 EDWARD VII., A. 1907

minerals of any kind. The game consists of moose, caribou, deer, bears, rabbits, otter, mink, martens, porcupine, wolf, coyote, lynx, grouse, duck and geese.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5.

Township 44.—The best route for reaching this township is westerly from Lacombe, following the road allowances and road diversions. They are in good condition during the whole of the year with the exception of the spring of the year when they are practically impassable. The soil consists of black loam, black muck and clay and might be adapted for agriculture after the country is opened and improved, there being a great many muskegs. The surface is entirely covered with small timber, second growth timber, willow, scrub and windfall. The timber is not large enough for building purposes. There are no hay lands. There is a good supply of water in the numerous small streams and no difficulty would be experienced in obtaining good water by digging. There are no lands liable to be flooded and there are no streams of sufficient size to develop water-powers. The climate is generally clear. However, there is always sufficient rainfall to mature crops. The summers are hot with temperatures from 70 to 90 degrees. There are frosts every month in the year. There is plenty of wood for fuel. There are no stone quarries nor minerals of any kind. The game consists of moose, caribou, deer, bear, rabbit, otter, mink, marten, porcupine, wolf, coyote, grouse, duck and geese.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5.

Township 76.—Is gently undulating with general descent towards the northwest, numerous spruce muskegs alternating with low ridges of poplar and spruce from three inches to eighteen inches in diameter, with a few birch and balsam and a thick growth of alder and willow in places. A chain of open sloughs with a luxuriant growth of grass extends north and south across the line in section 35. A creek twenty links wide with a slow current crosses the line, course north in section 34. The soil is black loam on clay subsoil and in places sand subsoil.—*Henry W. Selby D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 34.—From the town of Olds, Alberta, the eighth base line road was followed west for fifteen miles to Eagle Hills post office. A local trail then turns northwest, leading to Red Deer river a little distance above its confluence with James river and near the corner between townships 34 and 35, ranges 4 and 5, west of the fifth meridian. The Red Deer is here forded, and the valley of James river is followed west until township 34, range 6 is reached. The valley of James river afforded means of shifting camp. The road up the valley of James river is very rough, and it is necessary to ford the river at many points, and this can only be done at low water. The soil is generally boulder clay throughout the township, although pockets of black loam occur occasionally. The country is most suited for a timber reserve. The valley of James river is rough and broken. South of James river the country is rolling, and ravines running towards the river break the surface. North of James river the country is generally rolling. The valley of Stony creek forms a deep cañon in sections 21 and 22, but opens out in a broad valley in sections 29 and 32. The valley of James river is wooded with patches of spruce, tamarack, poplar and willow. South of James river is generally densely wooded with large poplar, jackpine and willow. North of James river is generally wooded with poplar, jackpine and willow. No timber of

SESSIONAL PAPER No. 25b

commercial value is found in this township. Practically no hay can be obtained. James river, Stony creek and numerous springs furnish a plentiful water supply. James river affords locations for establishing water-powers giving from six to ten feet head. No falls, however, occur. The climate is similar to that prevailing in other parts of northern Alberta. Summer frosts are usual. No rock in situ or outcrops of bedded rock were observed. No minerals were observed. Grouse, partridge and duck are plentiful in season, tracks of bears and deer were frequently observed.—*A. W. Ponton, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 42.—The best route for reaching this township is westerly from Lacombe following the road allowances and road diversions. They are in good condition during the whole of the year, with the exception of the spring months when they are practically impassable. The soil consists of black loam, clay and a little sand and is well adapted for agriculture. The surface is covered with timber, second growth trees and windfall. The best spruce is to be found in the southwesterly part of the township and is of large size. The supply is not large enough to reserve for lumbering purposes. There are no hay lands. There is a bountiful supply of spring water of the choicest variety, which can be obtained at any time of the year. Wolf creek takes its rise in this township and flows northerly into Saskatchewan river. The streams average from five to thirty feet wide and from two to eight feet deep, with good currents and large volumes of water. There are no streams of sufficient size to develop water-powers. The climate is generally clear. However, there is always sufficient rainfall during the summer to mature crops. The summers are hot with temperature of 70 to 90 degrees. There are frosts every month in the year. There is plenty of wood for fuel. There are no stone quarries nor minerals of any kind. The game found consists of moose, caribou, deer, rabbits, otter, mink, marten, porcupine, wolf, coyotes, lynx, bear, grouse, duck and geese.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 43.—The best route for reaching this township is westerly from Lacombe, following the road allowances and road diversions. They are in good condition during the whole of the year, with the exception of the spring months when they are practically impassable. The soil consists principally of black loam with a clay sub-soil and might be adapted for agriculture after the country is opened and improved. The surface is covered with small timber and windfall which is sufficient for building purposes only in a few places. There are no hay lands. There is a good supply of fresh water at all times in the numerous small streams. A large branch of Medicine river flows through the northeast corner of the township and there is also a large lake situated on sections 25, 35 and 36. There are no streams of sufficient size to develop water-powers. The climate is generally clear. However, there is always sufficient rainfall to mature crops. The summers are hot with temperature from 80 to 90 degrees. There are frosts every month in the year. There is plenty of wood for fuel. There are no stone quarries nor minerals of any kind. The game found consists of moose, caribou, deer, bear, rabbit, otter, mink, marten, porcupine, wolf, coyote, lynx, grouse, duck and geese.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 44.—The best route for reaching this township is westerly from Lacombe, following the road allowances and road diversions. They are in good condi-

6-7 EDWARD VII., A. 1907

tion during the whole of the year, with the exception of the spring months when they are practically impassable. The soil consists generally of a good stratum of black loam with a clay subsoil and might be well adapted for agriculture after the country is opened and drained. The surface is entirely covered with timber consisting of spruce, pine, tamarack, poplar and scrub, very evenly scattered over the township. The timber is sufficiently large for building purposes and will answer the purposes of settlers, but the quantity is not large enough for lumbering. There are no hay lands of large dimensions; an acre or two might be found in a few places. There is a good supply of fresh water at all times, there being many streams and a few small lakes. Some of the streams flow southeasterly into Medicine river, others northwesterly into Saskatchewan river, the watershed being about the centre of the township. The average size of the streams is from three to twenty-five feet wide and from two to eight feet deep, with good currents, and large volumes of water. None of them are of sufficient size to develop water-powers. The climate is generally clear, with plenty of rain to mature crops. The summers are hot with temperature from seventy degrees to ninety degrees. There are frosts every month of the year, but they would likely disappear after the country is opened. There is plenty of wood for fuel. There are no stone quarries nor minerals of any kind. The game found consists of moose, caribou, bears, deer, rabbits, otter, mink, marten, porcupine, wolf, coyote, muskrat, lynx, grouse, ducks and geese.—*W. F. O'Hara, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 54.—From Lake St. Ann a trail is followed through township 54, range 4 and part of 5, to section 14. From this section I opened a trail to section 25, township 54, range 6. This trail is good only as a winter trail on account of the muskegs crossed. The soil is good for agriculture; all the quarter sections with the exception of two, belong to classes one and two. It consists of a layer of black loam with a subsoil of clay or sandy clay. The surface is a rolling country the western part of which is pretty well timbered as is also a part of sections 28 and 29. The rest is an old brulé, with dry wood standing, and a new growth of poplar and willows. The timber consists mostly of poplar with scattered spruce. The poplar ranges in size from one to ten inches in diameter, except in the brulé, where it is very small. Some spruce timber is found scattered with the poplar and ranges in size from five to twelve inches in diameter. There is no place where hay can be cut in any quantity. Outside of lake Arnault, there is no other water but Pembina river, which crosses sections 30 and 31. Its water is very good and the current swift. The river was low at the time of the survey. Its width averages over four chains. There are no falls in the river, though in sections 30 and 31 the current is swift, but no water power of importance could be developed by the building of dams. The climate is something like that of Edmonton. Dry wood is the most readily available fuel. Seams of bituminous coal are seen along the Pembina river, some being over one foot in thickness. No stone quarries nor minerals except the coal mentioned above, were found. Tracks of deer were seen a few times.—*Raoul Rinfret, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6.

Township 76.—Is gently undulating. In section 36, spruce, muskegs alternate, with low ridges of poplar, spruce and jackpine, the area covered by the ridges being in excess of that covered by muskeg. This gradually changes as we go west until in sections 34 the area of muskeg is largely in excess of the dry land. Sections 33 and 32 are dry burnt muskeg with a thick growth of willow and a few bunches of green spruce. Section 31 is a dry burnt slash with a few sloughs and swamp holes and a

SESSIONAL PAPER No. 25b

thick growth of willow and small poplar brush. The soil in the muskegs is black loam, while on the ridges it is clay, sand or gravel with a few inches of black loam in places. *Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 7.

Township 26.—This township is easy of access by way of Morley, a station on the Canadian Pacific railway, or by good roads from Calgary. The soil consists generally of black sandy loam underlaid by a clay or gravelly subsoil. No crops, as far as I can learn, have been grown here, although in the township to the east lands are being cultivated, and both oats and potatoes grown. It is a timbered township, the eastern half containing some spruce up to twenty-four inches in diameter, jackpine up to eighteen inches and Douglas fir of still larger dimensions; it is doubtful, however, if the latter are sound. Much of the best timber appears to have been cut, there being a saw-mill a short distance to the south, on the Stony Indian reserve, which latter cuts off nearly one-third of this township. The Douglas fir is found principally on the southerly portions of sections 14, 15 and 16. The westerly half of this township is covered principally with second growth poplar, jackpine and spruce. The easterly half is hilly, whereas the westerly half is rolling and undulating. No hay lands of any extent were met with, the low lying land being generally covered with a dense growth of willows and more or less stony. I would consider it advisable to have the remaining timber in this township reserved for the needs of the future settlers in this township. It is well watered, on the north by Ghost river, numerous ponds, which, however, may be dry in dry seasons, and also by numerous spring creeks. Ghost river averages about one chain in width in dry weather, but it is apparent, that at times it has a width of from five to ten chains with a very rapid current. The adjacent lands, being high are not liable to be flooded, except some small flats, which have the appearance of being flooded from time to time. There are no falls, and it is very improbable that any power may be developed along the river in this township. I would say that the climatic conditions do not appear favourable for raising and ripening crops to any extent, owing to prevailing summer frosts. If of any particular value, I would consider this township to be better adapted for pasturing cattle. For fuel, plenty of wood is available. No coal of any description was observed. Owing to the close proximity of this township to the Indian reserve no game was observed, except an odd partridge or prairie chicken, with a few rabbits, and there do not appear to be any fish in that part of the river traversing this township.—*C. F. Miles, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 7.

Township 76.—Is gently undulating with large muskegs which have been burned over, alternating with low ridges, some of which are covered with green poplar, spruce and alder brush, while others are covered with burnt slash and scrub poplar. The muskegs still appear to drain towards the north. The soil on the ridges is mostly sand; in the muskegs black loam.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 24.—Kananaskis station, on the Canadian Pacific railway, is in section 30, in this township. The soil is for the most part limestone rock, but some loam is found in the northern and central parts suitable only for ranching and not very good even for that. The surface is generally timbered. There is considerable good green timber on section 20 and 21, but the balance is small or fire-killed. There is no hay.

6-7 EDWARD VII., A. 1907

The water is fresh and the supply sufficient and permanent. Bow river, with an average width of 300 feet and depth of 3 feet and with a velocity of 5 feet per second at time of survey, runs through the township. There is little liability of flooding. Water-power can be developed at Kananaskis falls and the Canadian Pacific railway engineers were working on surveys and plans during the past and present season. The construction of dams as proposed by them would flood Mr. Edward Loder, on section 30, where he has a residence, stables, &c. Summer frosts are quite frequent, the climate being somewhat colder than at Calgary. Wood is the chief fuel and is obtained in the township. A small coal mine was noticed in section 9 on Kananaskis river. There are no stone quarries, and coal is the only economic mineral noticed. Mule deer and grouse were the only game seen. A lime kiln is run by Mr. Loder at Kananaskis station and he and his employees and the Canadian Pacific railway section men are the only residents of the township. The rock for the lime kiln is procured in section 25, township 24, range 9.—*C. C. Fairchild, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 53.—This township is covered with a heavy growth of timber consisting of poplar from eight to sixteen inches in diameter and spruce from ten to eighteen inches, excepting sections on the north of Lobstick river, over which the fire has run, leaving only clumps of green timber and dry wood. The heaviest timber (that which is fit for converting into lumber) is on sections 3, 4, 5, 6, 7, 8, 9, 10, 17, 18, 19 and 20. The land in this township is level and consists of from three inches to twelve inches of loam with clay subsoil. It is well watered by numerous creeks and springs flowing into Lobstick river. Lobstick river enters the township on section 31 and flows across sections 20, 29, 28, 27, 26 and 25. The course of the river is very tortuous; all along its bed are found fragments of coal and clay iron stones. The Jasper House pack trail, that I opened as a wagon trail, crosses sections 36, 26, 27, 28, 29 and 30. There is no game, and but few fish in the river.—*A. Michaud, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 55.—There are two roads reaching this township, but the best one at the present time is the one that passes to Lake St. Ann mission and from there to the south crossing of Pembina river. The soil is a black loam with a white clay subsoil and is not suitable for farming purposes. It is entirely covered with large timber, such as spruce, balsam, jackpine, poplar and cottonwood varying from five to twenty-four inches in diameter. There are a few hay marshes in sections 33, 34 and 35, but of little importance. Water is very scarce, though the northern part of this township shows many small coulées, which appear to be dry the most of the year. There is no water-power. The climate is the best in all the west. No summer frosts occur. No indications of coal, stone quarries nor minerals of any kind were noticed. Foxes, lynx and wolves are plentiful but other game is scarce. This township would make a good timber reservation.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 56.—This township is about eighty miles northwest of Edmonton. There is a good trail as far as Lake St. Ann mission, but from this place the road has been lately opened through a heavy bush and is not very good on that account. There is also another road farther north which has been opened by the Grand Trunk Pacific railway for their exploring purposes. I am told it is much longer but better. The soil

SESSIONAL PAPER No. 25b

is very rich and composed of black loam six to eighteen inches thick with clay as subsoil. It is suitable for general farming. The surface is level, covered with a second growth of poplars and inclined towards the north. All these small poplars are dry, and another fire will clean the place. The western part of this township is broken by deep ravines. It is covered by bluffs of poplar and spruce. In a few places the timber is from six inches to eighteen inches in diameter and ought to be reserved for settlers. There are just a few hay marshes, but the whole surface is covered with long grass and wild pea-vine. The water is fresh and the supply permanent. The south branch of Paddle river crosses the northern part in sections 35, 34, 33, 28, 29 and 30. It is about one chain wide. There is no water-power. The climate is the best in all the west, there being no summer frost and the winters are mild. Indications of coal are to be seen all along the banks of Paddle river. There is no stone quarry. Game is plentiful, foxes, wolves, bears, badgers, lynx and birds of all kinds.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 57.—This township is about eighty miles northwest of Edmonton. There is a good trail as far as Lake St. Ann mission, but from this place the road has been lately opened through a heavy bush, and is not very good on that account. There is also another road farther north which has been opened by the Grand Trunk Pacific railway for their exploring purposes; I am told it is much longer but better. The soil is very rich and composed of black loam six inches to eighteen inches deep with clay as subsoil. It is suitable for farming, especially sections 1 to 24, inclusively. The surface is level and covered with a second growth of poplar and is inclined towards the south. All this small poplar is dry and another fire will clean the place. The northern part of this township is broken in places and rolling. It is covered by bluffs of poplar and spruce. In a few places the timber is from six to eighteen inches in diameter and ought to be reserved for settlers. There are just a few hay marshes, but the whole surface is covered with long grass and wild pea-vine. The water is fresh and the supply permanent. Paddle river crosses the northern part, in sections 31, 32, 28, 26, 27, 25, and the southeast corner in sections 1 and 2. The south branch of this river is about one chain wide and two feet deep with a current of three miles an hour. The north branch is not quite so large. There is no water-power. The climate is the best in the west with no summer frost and mild winter. Indications of coal are to be seen all along the banks of Paddle river. There are no stone quarries. Game is plentiful: foxes, wolves, bears, badgers, lynx and birds of all kinds. There are three different railroad surveys crossing this township and it is probable that the Canadian Northern will come through pretty soon.—*C. E. Lemoine, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 8.

Township 76.—Is undulating and generally covered with poplar, spruce, jackpine and birch from four inches to twenty inches, and a thick growth of alder brush. Some patches of burnt slash and windfall are met with and a few muskegs and sloughs also occur. Several small creeks flow south across the line. The soil is mostly clay or sand with very little loam on the surface, except in the swamps and muskegs.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 9.

Township 24.—The Canadian Pacific railway runs through this part of the country. There is little arable soil in this township and it is fit only for grazing. The

6-7 EDWARD VII., A. 1907

surface in the valley and on the slopes is covered with spruce, averaging four inches in diameter, while the mountain tops are quite bare. There is no hay. The water is fresh and the supply in Bow river is permanent. This river averages four chains in width and from three to four feet in depth, with a current flowing at the rate of about five miles an hour. Water-power could be developed by a dam across the river but in low water no great power could be procured. There are occasional summer frosts. Wood is the fuel most readily obtained, although coal is found in sections 5 and 6, but as little of the seams are uncovered the quantity and quality are problematical. There is plenty of limestone. The Canadian Pacific railway have a quarry in section 22. The Loden Bros. Lime Company have a quarry in section 25, and the Western Coal and Cement Company have an undeveloped quarry in section 21. Coal is the only mineral found in the township. Mountain sheep, goats and mule-deer were seen. The river valley through this township is generally narrow and the surface is practically all mountain.—*C. C. Fairchild, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 9.

Township 53.—This township is covered with a heavy growth of timber, consisting of poplar, eight to ten inches in diameter and spruce from ten to eighteen inches, excepting sections 36, 35, 25, 26, 34, 27, 33, 28, 21, 29, 20, 30, 19 and 18 over which the fires have run, leaving only a few clumps of green timber and dry wood. There is now, on these fire-swept sections, a second growth of poplar and spruce. These sections are well adapted for mixed farming and ranching. The land is level and consists of from three to twelve inches of black loam on clay subsoil. It is well watered by numerous creeks and springs. Chip lake covers part of sections 31, 30, 29, 28, 33 and all section 32. Lobstick river runs across sections 36, 35, 34 and 33. The Jasper House pack trail crosses sections 25, 24, 23, 22, 21, 16, 17 and 18. There are some good fish in Chip lake, but no game except a few lynx, wolves and rabbits.—*A. Michaud, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 9.

Township 76.—Is an undulating country as far as the east boundary of section 31, covered with poplar and spruce from four inches to twenty inches in diameter with a few birch, jackpine and a thick growth of alder brush. Section 31 is almost wholly a spruce muskeg covered with small spruce. The soil on the ridges is sand and clay and between the ridges it is black loam of varying depths on a subsoil of clay or sand. In section 34 there is a good pack trail south to Lesser Slave lake.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 10.

Township 24.—The Canadian Pacific railway traverses this township. The soil is generally rocky, except in the river valley where it is a fair loam suitable for grazing. The valley of Bow river is generally timbered with spruce and poplar, averaging 6 inches in diameter and having a thick undergrowth of willows along the river banks. The greater part of the larger timber is fire-killed. There is no hay. The water is fresh. Bow river and the creeks joining it afford a sufficient and permanent volume. The Bow is broken up into numerous channels in high water and considerable portions of the lands lying between the various channels are liable to be flooded. No water-powers are feasible. Summer frosts are prevalent and crops grown are only for green feed. Coal and wood are easily obtained in the township; Canmore being a mining town where soft steam coal is mined in large quantities. There are no stone quarries, ex-

SESSIONAL PAPER No. 25b

cept a lime kiln at the Gap on section 24. There are no other minerals except coal found in the township. Mountain sheep and goats were seen in the mountains and a few deer in the valley.—*C. C. Fairchild, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 10.

Township 25.—Sections 5, 6, 7 and 8 lie just to the north of Canmore on the main line of the Canadian Pacific railway. The soil is a sandy loam suitable for grazing only. The surface is generally timbered with poplar and spruce, averaging four inches in diameter with willow underbrush on the river bank. There is no hay. Bow river runs through sections 6 and 7 providing plenty of good water. The banks are low and both sections are liable to be flooded. There is no suitable place for damming the river to generate water-power. Summer frosts are common. The climate is similar to that of Banff. Wood can be obtained on the sections and soft coal at Canmore or hard coal at Bankhead. No coal or lignite veins were observed in these sections. There are no economic minerals. A few mule-deer were seen.—*C. C. Fairchild, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 10.

Township 76.—Is gently rolling, consisting of low ridges covered with poplar, spruce, birch and jackpine, alternating with strips of spruce muskeg. The soil on the ridges is mostly black loam from two inches to eight inches in depth, subsoil clay or sand, and in the muskegs it is black loam.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 11.

Township 25.—The Canadian Pacific railway traverses this township. The soil is generally rocky with some soil suitable only for grazing. The surface is generally covered with pine, spruce and poplar, averaging four inches in diameter, while the river flats are covered with willow. There is no hay. The water in Bow and Cascade rivers is fresh and the supply is permanent. Bow river is much broken up by different channels and the land between the various channels is liable to flooding. There is little chance for the development of water-power. The river will average four feet deep with an average current of four miles an hour. Summer frosts are common. The climate is that of Banff. Wood and coal are both found in the township in sufficient quantities for local use. There are no stone quarries. Deer, sheep and goat are found in the township.—*C. C. Fairchild, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 11.

Township 26 (sections 5 and 8).—Anthracite village, now deserted, is on section 8. The coal mine here is closed. The surface of these sections is generally covered with spruce and pine averaging about six inches in diameter. The soil is fit only for pasture. There is no hay. Plenty of fresh water is found in Cascade river, which averages fifty feet in width, two feet in depth and has a current of five miles an hour. There is little danger from flooding and the supply of water is fresh and permanent. There are no suitable places for water-power development. The climate is that of Banff. Summer frosts are frequent. Coal and wood are both found. There are no stone quarries. Deer were seen on section 8.—*C. C. Fairchild, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 11.

Township 76.—Sections 36, 35 and 34 the country is undulating and covered with poplar, spruce, birch and some jackpine on the ridges; spruce, tamarack and willows between. Sections 33, 32 and 31 is a rolling country with thick poplar, a few spruce, birch and jackpine in which is mixed thick alder brush. In section 32 a good trail crosses the line to the southeast which reaches Lesser Slave lake at Big point, also Shaw creek with good water flows southerly to the lake. Soil black loam on clay and sandy subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 12.

Township 76.—Is a rolling country with large beaver meadows between the low ridges. The timber on the ridges is mainly poplar. Some spruce, birch and jackpine are seen, and in the valleys some dry muskegs. On sections 32 and 33 there are large ponds of fairly good water with a good growth of grass about them. The soil is mainly black loam on clay and gravel, clay and stones and sandy clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 13.

Township 76.—Is a gently rolling country with irregular ridges, covered mainly with poplar, scattered large spruce, jackpine and some birch, beaver meadows and some spruce muskeg. In section 34 the northeast branch of Salt creek is met with and a luxuriant growth of vegetation in the flats through which it flows. This creek could be described as the dividing line between the lands to the west suitable for agriculture and those at present to the east unfit for farming purposes.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 14.

Township 76.—The line crosses what is known as Salt creek prairie, in sections 36, 35 and 34 where are seen to the south and southwest, inclosed clearings, farm buildings and excellent crops of grain, vegetation everywhere indicating a richness of soil not noticeable anywhere east of these lands. A wagon road crosses the line on section 34 connecting Lesser Slave and Whitefish lakes. Two branches of Salt creek cross the line in sections 34 and 35, good water but very hard; on the west half of section 34 the line again enters heavy timber, mainly poplar with a few spruce and jackpine in places. Soil, black loam on clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 15.

Township 76.—The line across this range is over a gently undulating country on the height of land overlooking the west end of Lesser Slave lake to the south, and runs through thick poplar and alder brush and occasional bunches of spruce. No water is seen in the small water courses which are dry in summer. Near the east boundary of section 31 the wagon road connecting Lesser Slave lake and Peace River landing is crossed. Soil, black loam on sandy clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 16.

Township 76.—Is gently undulating and across sections 35 and 36 is in green poplar from four inches to eighteen inches in diameter. Near the east boundary of section 34 a wagon road is crossed which connects the settlement to the south with the Peace river road to the north. From section 34 west the line runs through an old burnt district of scrub poplar, large scattered poplar, large laying spruce and jackpine, slash and windfall. Soil, black loam on sandy clay.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 17.

Township 76.—Is gently undulating to section 31 where the line crosses the valley in which South Heart river flows. This range is covered mainly with poplar and occasional bunches of spruce. On section 32 and section 5 the spruce and poplar is very large, and convenient for lumbering operations, where it could be taken down the river to Slave lake. This range will make good farming land when cleared. Soil, black loam on sandy clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 18.

Township 76.—Is gently rolling to Winakami lake, in section 35. The timber is mainly poplar from three inches to twelve inches with scattered bunches of spruce. Winakami ('not good water') lake begins in section 35 and is five and one-quarter miles across and about four miles wide north and south. There are large hay meadows on the south shore. This ought to be a good ranching property as stock does well and does not object to the water. Several Indians and half-breeds have houses near the west end of the lake and quite a band of horses. Some fish are caught in the lake and large flocks of waterfowl were seen.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 19.

Township 76.—The west limit of Winakami lake extends nearly to the east boundary of section 35. Here the whole character of the country changes, fire having overrun the range leaving only islands of green spruce and poplar and burnt slash, and burnt clean of timber in places. During a wet year this range, being so nearly level, there would be a good deal of water on it, but this year it is all quite dry. Soil, thin layer loam on clay. Vegetation indicates that there is a rich soil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 20.

Township 76.—The line passes through a gently undulating country which is covered with a growth of poplar, a few spruce and occasional bunches of willow and alder brush. This should make a good farming section of the country. Soil, generally black loam on clay or sand, clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 21.

Township 76.—Is a gently undulating country with very little timber of any value. It having been burnt over and in places almost clear of slash, grass grows luxuriantly.

6-7 EDWARD VII., A. 1907

Soil, generally black loam on clay subsoil and should be first-class farming land. In section 31 a coulée is met with in which Peavine creek flows from the north and east, southwesterly into Little Smoky river. Water is slightly alkaline. The land on the west side of the coulée is thickly covered with vetch and pea-vine and it is a favourite feeding ground for horses and big game.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 22.

Township 76.—Gently undulating country which for four miles is thickly covered with poplar and spruce. Section 36 has been partly run over by fire and left a bad slash and windfall. Between the ridges occur willow swamps which are dry this year. On sections 32 and 31 there are wet muskegs, tamarack and spruce swamps and beaver meadows ; vegetation is luxuriant. Soil, black loam on clay subsoil, when drained should make good farming or ranching land.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 23.

Township 76.—Is composed of gently rolling country to section 33 where the descent to Little Smoky river begins. The height of land or low ridge in section 33 extends southeasterly and northwesterly, to the north of which the country is full of sloughs, ponds and beaver meadows with islands of poplar and spruce, some birch, alder and willow. South of the ridge is the descent to the valley of Little Smoky river. Near the east boundary of section 31 the line crosses the river. It is about nine chains wide, of varying depth and rapid current, owing to the numberless rapids occurring in its course northerly. At present the water in many places is not over two hundred feet wide and so shallow as to be easily forded in the rapids. Section 31 is very rough, being the west bank of the river, it rises about five hundred feet to the range line. The timber on this section is poplar, large spruce and some birch. Soil, generally black loam on clay subsoil.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 24.

Township 76.—Section 36 is on a general ascent and covered with heavy poplar and spruce. Section 35 is descending to where Smoky river is met with at the line between sections 34 and 35, by aneroid barometer 586 feet below the height of land. The bed of the river is fourteen chains wide but at present the water only covers nine chains in width. The depth is from four to twelve feet and the current too rapid to ford. East half of section 34 is the west bank of the river, and is a big landslide covered with timber lying in all directions. The west half of section 34 and sections 33, 32 and 31 is a gently rolling country with a light covering of leaf mould on sand subsoil. The timber is mainly jackpine with some spruce and poplar, very little vegetation and totally unfit for farming purposes.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 25.

Township 76.—Is composed of gently rolling country, the ridges being nearly all sand and a light growth of jackpine more or less burnt over. Between the ridges are sloughs and large beaver meadows surrounded by old dry slash and windfall. On section 33 there has been a large pond or lake, but now dry, the bed of which is alkaline sand and hard enough for a man to walk upon, but unsafe for horses or cattle. A

SESSIONAL PAPER No. 25b

creek flows northeasterly on section 33 towards Smoky river. This range is unfit for farming purposes as seen from the line.—*Henry W. Selby, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 15.

Township 19.—Sections 33 and 34 is open range land and only fit for grazing. It is hilly and part of it is quite rocky.—*Jos. E. Ross, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 17.

Township 20.—Section 31 of this township is level but rather low. The land would be flooded, for a short time at least, when Thompson river is at its highest. It is timbered with cottonwood. The soil is a loose, sandy loam suitable for cultivation.—*Jos. E. Ross, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Ranges 23 and 22.

Townships 13, 12, 11, 10, 9 and 6, range 23 ; townships 11, 9, 8 and 7, range 22.—In township 13 and part of 12, the line forming the limit of the railway belt, follows the valley of Spius creek which runs in a very rocky cañon. The timber is open and chiefly bullpine, though high up balsam and spruce take its place. Grazing is good along the lower slopes of the hills. Coal has been found here and farther east and a great many claims have been surveyed. Drills have been at work, and while no mines are yet working it is quite possible that in time this will be a very valuable addition to the resources of the country. Through townships 11 and 10 the line runs along the watershed between Spius creek and Coldwater river. Bullpine is replaced by spruce, balsam and fir and the country is very hilly. One ranch was taken up at the north end of Murray lake, but has been abandoned on account of the excessive snowfall at this elevation. Beyond this there is practically no agricultural land in these townships though there is coal. In township 9 there are a few strips of bench land along the Coldwater, which might be farmed if a railway was built into Hope by the Coquahalla cañon. There are fir and spruce in the valley as far south as July creek. Beyond this point it has been burnt, and the railway belt boundary passes through many miles of standing burnt timber through townships 9, 8 and 7. Bold high hills up to 6,000 feet run parallel to a line of jagged peaks four or five miles west. All this country contains minerals more or less and we came across mineral claim-posts in the most out of the way spots. There are no actual mines in the belt in these townships, but people in Princeton and Granite Creek seem to have plenty of confidence in its future. Beyond a considerable amount of rather scrubby fir, spruce, balsam and pine, which would be difficult to get out, the land in these townships is of no value whatever except for mining, and there seems a good deal of activity in this direction, especially at Circle City. There is little but precipices, snow and ice between the Canadian Pacific railway and the belt limit.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 23.

Township 4.—In this township the line runs into rougher country, and crosses a divide separating a locality through which it is just possible to take a pack train, which may live on natural food, into the regular coast timber, where hardly any grass grows and where it is necessary to carry oats. In section 34 there is a large flat, almost clear of timber, but very high.—*Alfred W. Johnson, D.L.S., 1905.*

6-7 EDWARD VII., A. 1907

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 23.

Township 5.—This township is to a large extent burnt. Some four or five miles west of the railway belt boundary, approximately on the north boundary of township 5, there is a mining camp called Summit City, where a good deal of prospecting is done in summer time. It is probable that many of these claims would become valuable if there were any means of transportation other than pack trains—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 23.

Township 6.—The line forming the limit of the railway belt runs over high hills, rocky in some places, but not usually, and partly burnt. There is timber along the creeks and on the north slopes, mainly spruce and balsam, but it is not very good.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 26.

Townships 10 and 11.—There is some bench land on the west side of Fraser river in sections 27 and 34, of township 10 and sections 2 and 11 of township 11, on which some settlement has already been made.—*A. W. Johnson, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 27.

Township 15.—There is open bullpine timber in this township and some bench land that could be cultivated if water were procurable.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 27.

Township 16.—Between section 17 and the south boundary of this township there is no good land, not already occupied by Indians. About the northeast corner of section 29 is a ranch known as Walsh Place. There is some fair bullpine timber, mainly on the east side of the valley, and some bench land on the same side that might be cultivated.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 27.

Township 17.—There is some bullpine on the east side of the valley and fir and bullpine on the west, but only scattered.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 28.

Township 18.—Most of the land has been taken up, but there are benches that will be cultivated when the country has a larger population, and timber which will be valuable in a few years time though apparently not of much use now. There is a hydraulic outfit at the southwest corner of lot 83 on the river, with power carried across in a pine slung on a cable, and whenever the water is low, numerous Chinamen make a living by rocking. This applies to the river from Lytton up. The river runs in a deep

SESSIONAL PAPER No. 25b

cut almost all the way from Lytton. Along this cut are benches varying from a few chains to three-quarters of a mile in width and from these benches the mountains rise very steeply on both sides of the valley, particularly on the west.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 29.

Townships 4, 5 and 6.—In these townships, with the possible exception of some rough benches near Sevenmile creek there is no land fit for cultivation. The timber is Douglas fir and cedar, neither very good, and some scrubby pine. The mountains, in most places, rise abruptly from the water and the shore is composed of rocky bluffs. There are two good sources of water-power, Eagle falls, in section 4, township 6, range 29, where a mountain stream forty links wide falls sixty feet into the lake; and Rainbow falls, in section 19, township 5, range 28, where a similar stream falls a couple of thousand feet over a series of perpendicular rocks, varying from seventy-five to two hundred feet in height.—*Alfred W. Johnson, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 29.

Township 7.—There is a logging camp here and the best timber is taken up. The land can be cultivated, though it is not very good and at present is heavily timbered. Near the mouth of Silver creek is a flat of good land, between the main channel and a high water channel, but the southern part of it is intersected by low strips that flood during high water. Farther north there are small patches of fair land on either side of the river. Several mineral claims have been surveyed near the northeast corner of section 23. Canoes can be taken up the creek for about three and a half miles, by use of line and pole, but rapids begin within half a mile of the mouth, just above the fish trap erected every year by the government for taking salmon eggs. There is a mile of very good beach at the mouth of the creek.—*Alfred W. Johnson, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 29.

Townships 8 and 9.—There is no land fit for cultivation in these townships. Silver creek runs in a cañon most of the way and the mountains rise abruptly on each side, in many places precipitously. Douglas fir and cedar grow profusely everywhere, but not of very good quality, and the creek would not be easy to drive on account of some very narrow cañons and four or five falls, one of which is nearly a hundred feet in height. Two or three miles beyond Snowshoe creek the main stream branches out into three forks, which rise in very wild rocky mountains with but little timber of any sort.—*Alfred W. Johnson, D.L.S., 1904.*

TOWNSHIPS EAST OF THE COAST MERIDIAN.

Township 20.—There is a little good land in the southeast quarter of section 7, perhaps twenty acres, and considerably more in sections 4 and 9. This land is not hard to clear, being timbered mainly with alder.—*Alfred W. Johnson, D.L.S., 1905.*

TOWNSHIPS WEST OF THE COAST MERIDIAN.

Fractional Township west of township 39.—This district has been thoroughly logged, and nothing but a few trees fit for shingles could be gotten out of it now. The weather was very wet during the time of survey.—*Alfred W. Johnson, D.L.S., 1905.*

INDEX.

	PAGE.
Report of the Surveyor General..	1
Appendix No. 1. Schedule of surveyors employed, and work executed by them, from July 1, 1905, to December 31, 1905.. . . .	15
Appendix No. 2. Schedule of surveyors employed, and work executed by them, from January 1, 1906, to June 30, 1906.. . . .	18
Appendix No. 3. Schedule showing for each surveyor employed during 1905, the number of miles surveyed of township subdivision lines, township outlines, traverses of lakes and rivers, and resurvey; also cost of the same.. . . .	20
Appendix No. 4. List of Dominion land surveyors who have been supplied with standard measures.. . . .	22
Appendix No. 5. List of lots in the Yukon Territory of which surveys have been confirmed during the year ending June 30, 1906..	25
Appendix No. 6. List of miscellaneous surveys in the Yukon Territory of which returns have been received during the year ending June 30, 1906.. . . .	26
Appendix No. 7. Statement of work executed in the office of the chief draughtsman.. . . .	26
Appendix No. 8. List of sectional maps revised and reprinted from July 1, 1905, to July 1, 1906, on three mile and six mile scales.. . . .	27
Appendix No. 9. Statement of work performed in the survey records office for the twelve months ending June 30, 1906.. . . .	27
Appendix No. 10. Statement of work executed in the photographic office during the twelve months ending June 30, 1906.. . . .	29
Appendix No. 11. Statement of work executed in the lithographic office during the twelve months ending June 30, 1906.. . . .	30
Appendix No. 12. Names and duties of employees of the Topographical Surveys Branch at Ottawa.. . . .	30
Appendix No. 13. Report of C. F. Aylsworth, D.L.S.. . . .	33
Appendix No. 14. Report of D. Beatty, D.L.S.. . . .	37
Appendix No. 15. Report of P. R. A. Belanger, D.L.S.. . . .	38
Appendix No. 16. Report of E. Bray, D.L.S.. . . .	41
Appendix No. 17. Report of L. T. Bray, D.L.S.. . . .	43
Appendix No. 18. Report of R. W. Cautley, D.L.S.; survey of sixteenth base line.. . . .	44
Appendix No. 19. Report of R. W. Cautley, D.L.S.; survey of thirteenth base line.. . . .	46

	PAGE.
Appendix No. 20. Report of W. A. Ducker, D.L.S.	47
Appendix No. 21. Report of A. Driscoll, D.L.S.	48
Appendix No. 22. Report of C. C. Fairchild, D.L.S.	49
Appendix No. 23. Report of L. E. Fontaine, D.L.S.	50
Appendix No. 24. Report of G. A. Grover, D.L.S.	51
Appendix No. 25. Report of E. W. Hubbell, D.L.S.	52
Appendix No. 26. Report of A. W. Johnson, D.L.S.	58
Appendix No. 27. Report of G. J. Lonergan, D.L.S.	63
Appendix No. 28. Report of C. F. Miles, D.L.S.	63
Appendix No. 29. Report of W. G. McFarlane, D.L.S.	66
Appendix No. 30. Report of T. S. Nash, D.L.S.	68
Appendix No. 31. Report of Geo. Ross, D.L.S.	71
Appendix No. 32. Report of J. E. Ross, D.L.S.	75
Appendix No. 33. Report of A. Saint Cyr, D.L.S., for 1905.	76
Appendix No. 34. Interim report of A. Saint Cyr, D.L.S., for 1906.	84
Appendix No. 35. Report of B. J. Saunders, D.L.S.	85
Appendix No. 36. Report of H. W. Selby, D.L.S.	87
Appendix No. 37. Report of J. N. Wallace, D.L.S.	94
Appendix No. 38. Report of Jas. Warren, D.L.S.	96
Appendix No. 39. Report of M. B. Weekes, D.L.S.	98
Appendix No. 40. Report of A. O. Wheeler, D.L.S.	99
Appendix No. 41. Report on Nakimu Caves, by A. O. Wheeler, D.L.S.	103
Appendix No. 42. Report of W. Thibaudeau, C.E.	127
Appendix No. 43. Examination papers of the Board of Examiners for Dominion land surveyors.	162
Appendix No. 44. Descriptions of surveyed townships submitted by Dominion land surveyors during the year ending June 30, 1906.	189
East of the principal meridian—Ranges 3, 9, 10, 11, 12, 13 and 14.	191
West of the principal meridian—Ranges 1, 2, 3, 4, 5, 6, 15, 16, 21, 22, 23, 29, 30, 31 and 32.	198
West of the second meridian—Ranges 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29.	208
West of the third meridian—Ranges 6, 7, 8, 9, 12, 13, 18, 19, 20, 26, 29 and 30.	237
West of the fourth meridian—Ranges 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28 and 29.	248
West of the fifth meridian—Ranges 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25.	303
West of the sixth meridian—Ranges 15, 17, 22, 23, 26, 27, 28 and 29.	325
East of the coast meridian.	327
West of the coast meridian.	327



Silver Creek, near Harrison Lake.

Photo by A. W. Johnson.



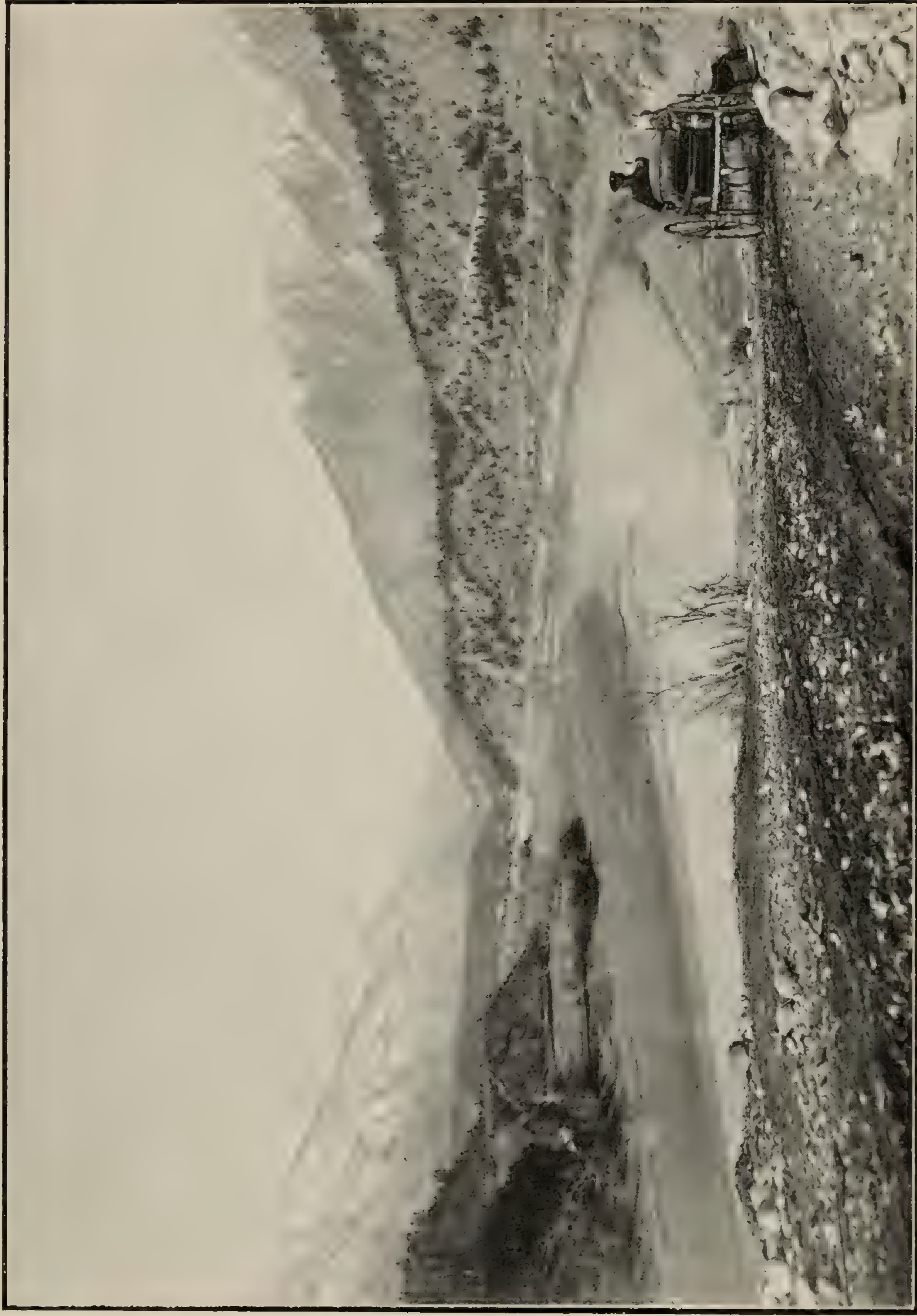
Fraser River near Hope.

Photo by A. W. Johnson.



Mountains near Hope.

Photo by A. W. Johnson.

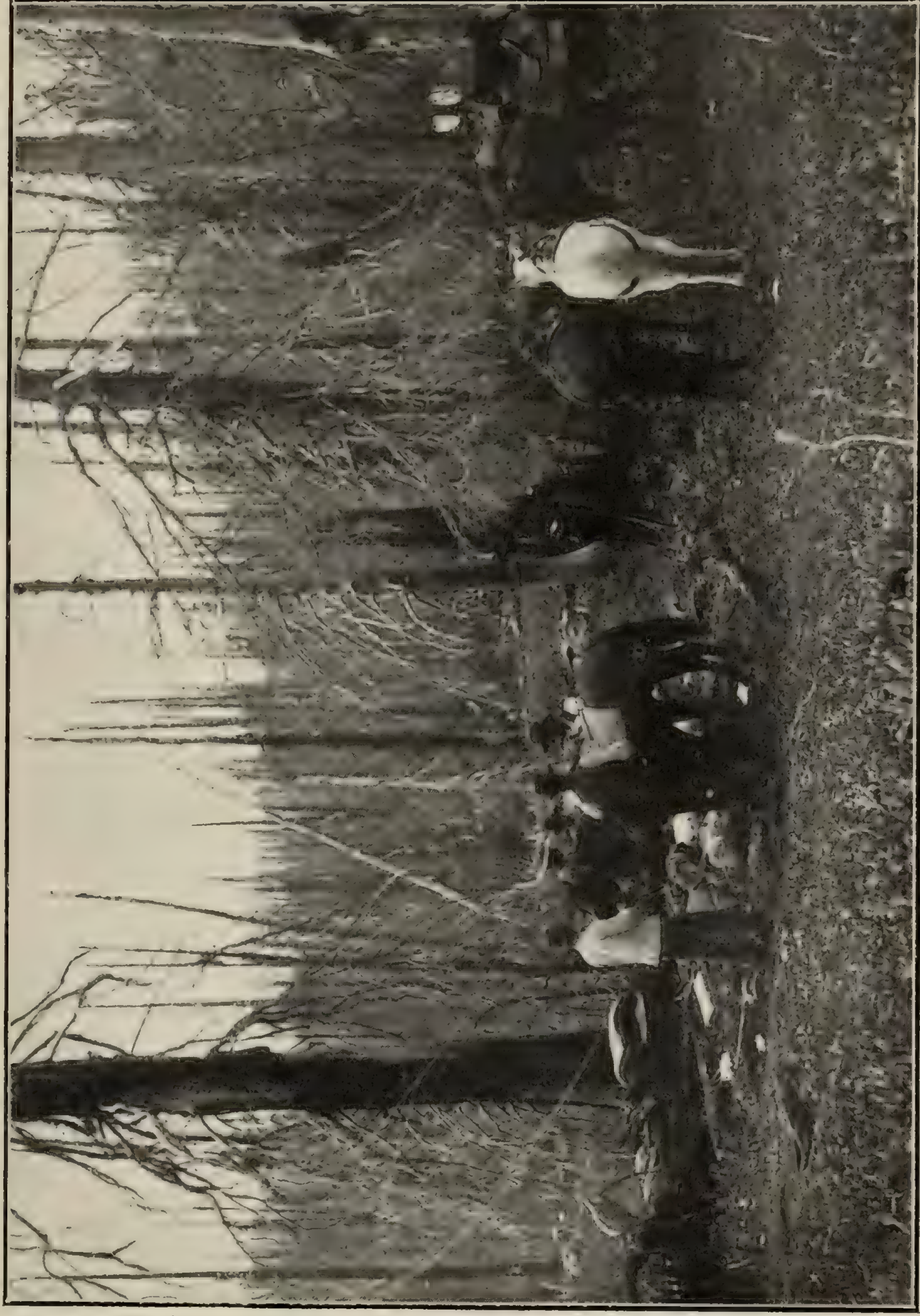


On the Nicola Road.

Photo by A. W. Johnson.



Farm near Mantle Lake, in the Nicola District. Photo by A. W. Johnson.



Pack Horses. Preparing to move camp.

Photo by A. W. Johnson.



Moving Camp in the Mountains.

Photo by A. W. Johnson.



Camp in the Nicola District.

Photo by A. W. Johnson.



Point Lockout, at the entrance to Valley of the Caves. Photo by A. O. Wheeler.

PLATE No. 10.



Photo by M. P. Bridgland.
The Cave entrance in the Gorge, showing the tree trunks by which
the first descent was made.

PLATE NO. 11.



Photo by M. P. Bridgland.
Cut A.—Where Cougar Creek drops below Gopher Bridge.

PLATE No. 12.

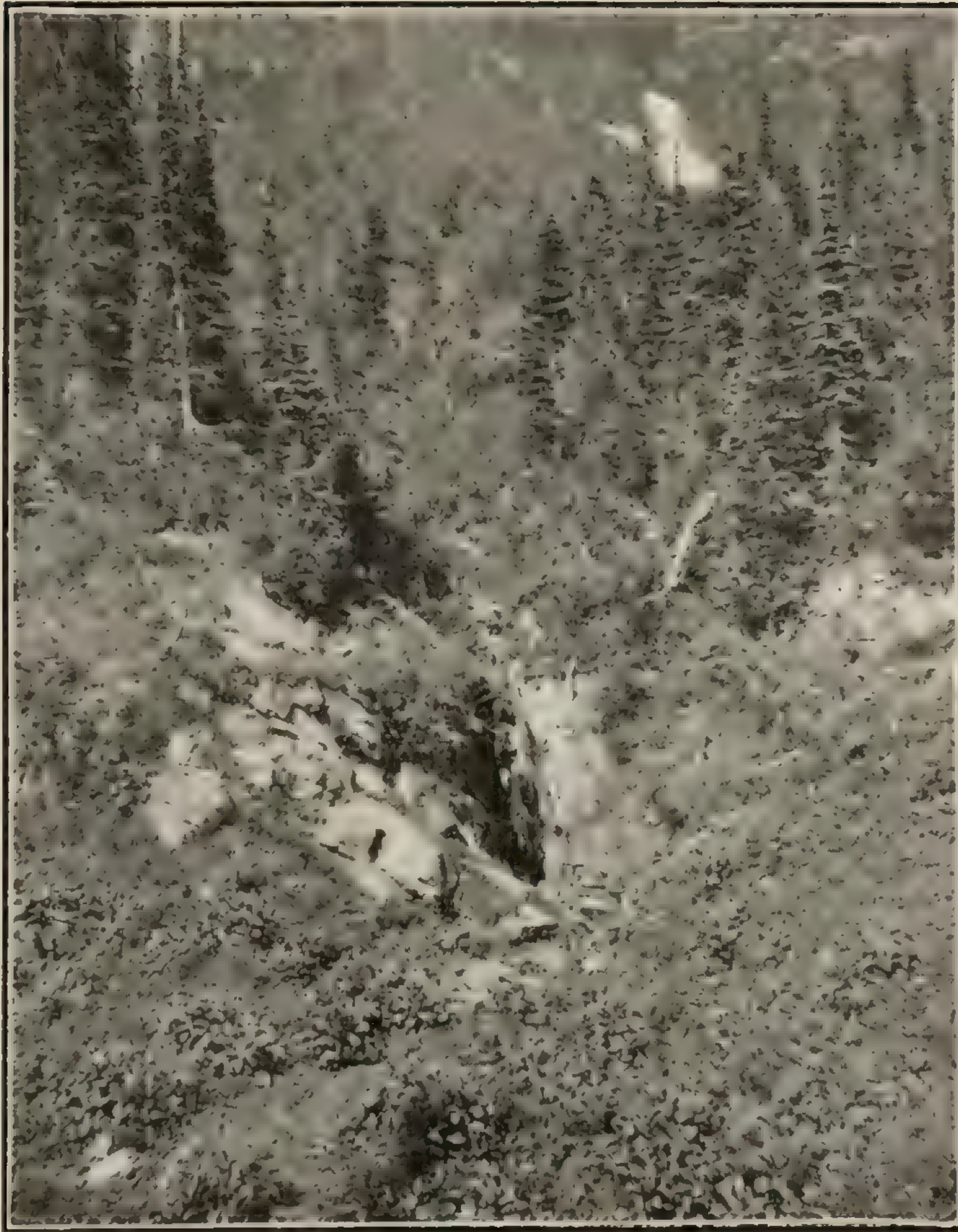


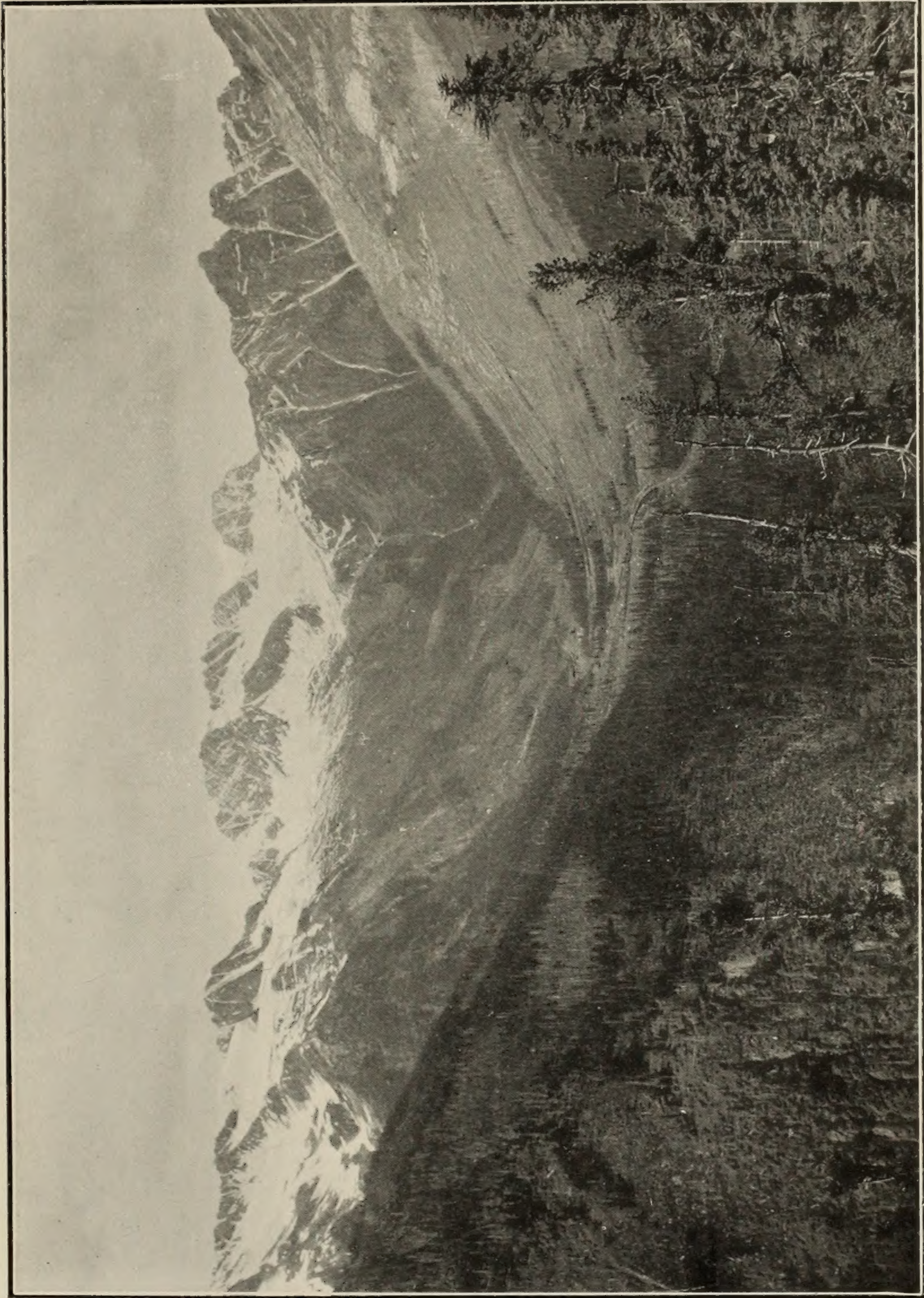
Photo by N. G. Wheeler.
Cut B.—Entrance No. 3 to "The Pit."



Ascending from "The Gorge" in October.

Photo by A. O. Wheeler.

PLATE NO. 14.



The Hermit Range and Rogers Pass, from Observation Point.

Photo by A. O. Wheeler.

